April 1983

Incorporating Spectrum User

sinclair user

1st YEAR OLD

Only 75p

Sinclair Research Ltd is not connected in any way with this magazine

MEET OUR FIRST USER OF THE MONTH



WHO SAYS SINCLAIRS ARE CHILD'S PLAY?

We find the leaders of the Pacmen

We investigate Sinclair distribution

Computer sales pass one million

Searching for data the basic way

Bumper month for new software

Eleven pages of programs

ZX-81 helps the handicapped

EXCLUSIVE BIRTHDAY OFFER ON PRINTER

COMPETITION-PRO JOYSTICK

• PRECISION GAME CONTROL!



For **ZX SPECTRUM**
Complete with stylish interface unit simply plug in for instant arcade action.

ONLY £25.00 inc. VAT

NOW AVAILABLE FROM LARGER BRANCHES OF
WHSMITH

Outstanding Features

- Self-centering stick
- Super strong nylon and steel construction, built to last.
- A total of 8 directions plus 2 large fire buttons.
- Arcade proven moulded leaf switches ensure incredible reliability.
- Complete with self contained boxed interface which simply plugs into the Spectrum expansion port (with or without printer).
- Easily programmed in BASIC or M/C

These arcade games, designed exclusively for the **Joystick** by leading software houses, are now available for Spectrum:

3D Tunnel	16/48K	(New Gen)	£4·95
Gulp Man	16K	(Campbell Systems)	£4·95
Time Gate	48K	(Quicksilva)	£6·95
Meteroids	16K	(Softek)	£4·95
Spooky Man	16K	(Abbex)	£4·95
Galaxians	16K	(Artic)	£4·95
Slippery Sid	16K	(Silversoft)	£4·95

Watch this space for more software!

SOLE UK DISTRIBUTOR
KEMPSTON MICRO ELECTRONICS
180a Bedford Road, Kempston, Bedford MK42 8BL

I wish to order:

Quantity	Item	Price
	Post & Packing	£1.00
	Total (VAT inclusive)	

Cheques/Postal orders should be made payable to Kempston (Micro) Electronics

Name ____________________

Address ____________________

Post to Kempston (Micro) Electronics, Dept SU4
180a Bedford Road, Kempston, Bedford MK42 8BL

Contents

sinclair user

Editor
Nigel Clark
Consultant editor
Mike Johnston
Production editor
Harold Mayes MBE
Staff writer
John Gilbert
Design
William Scolding
Editorial director
John Sterlicchi
Advertisement manager
John Ross
Sales executive
Annette Burrows
Editorial production assistant
Margaret Hawkins
Managing director
Terry Cartwright
Chairman
Richard Hease
Sinclair User is published monthly by EEC Publications Ltd.

Telephone
All departments
01-359 7481

If you would like to contribute to any of the Sinclair User group of publications please send programs, articles or ideas for hardware projects to:
Sinclair User and Programs
EEC Publications
30-31 Islington Green,
London N1 8BJ

Programs should be on cassette and articles should be typed. We cannot undertake to return them unless a stamped-addressed envelope is included.
We pay £10 for the copyright of each program published and £50 per 1,000 words for each article used.

Copyright 1983
Sinclair User

ISSN No. 0262-5458
Origination by
Outline Graphics.
Printed by
Eden Fisher (Southend) Ltd

Distributed by
Spotlight Magazine Distribution Ltd,
1 Benwell Road,
Holloway,
London N7
01-607 6411



page 42



page 89

NEXT MONTH

John Gilbert completes his series on programming for beginners and considers some of the other computer languages which can now be put on Sinclair machines. Stephen Adams reviews the graphics board from DK'tronics.

No. 1 Best Sellers for Your Spectrum!*



*No. 1 and 2 best selling Spectrum programs four weeks running in *Personal Computing Weekly* charts.

VISIT MIDDLE EARTH

Experience the fantasy of J. R. Tolkein's "HOBBIT" on your 48K Spectrum. Danger, adventure and excitement are all part of it in words and graphics, but it is you who must solve the problems. Special features never seen before. THE HOBBIT is the program everyone is talking about.
£14.95.

CAN YOU SURVIVE PENETRATOR?

PENETRATOR is the most amazing and sophisticated arcade game yet devised for the 48K Spectrum. Features include training mode, unique customizing, superior graphics, excellent sound and more!
£6.95.

MELBOURNE HOUSE PUBLISHERS Orders to: 131 Trafalgar Road, Greenwich, London SE10

Correspondence to: Glebe Cottage, Station Road, Cheddington, Leighton Buzzard, BEDS LU7 7NA

Trade enquiries welcome.

☐ Please send me your free catalogue.
Please send me:

SPECTRUM Books
- ☐ Understanding Your Spectrum £7.95
- ☐ Spectrum Machine Language For The Absolute Beginner £6.95
- ☐ Over The Spectrum £6.95
- ☐ The Complete Spectrum ROM Disassembly £9.95
- ☐ Spectrum Hardware Manual £5.95

16K SPECTRUM Cassettes
- ☐ Over The Spectrum No. 1 £5.95
- ☐ Over The Spectrum No. 2 £5.95
- ☐ Over The Spectrum No. 3 £5.95
- ☐ Programs from Spectrum Machine Language Book £5.95

48K SPECTRUM
- ☐ Penetrator £6.95
- ☐ The Hobbit £14.95

All Melbourne House cassette software is unconditionally guaranteed against malfunction.
Access orders can be telephoned through on our 24-hour ansafone (01) 858 7397.

Please add 80p for post and pack £ .80
TOTAL £ ______

I enclose my cheque/money order for £ ______
Please debit my Access card No. ______ Expiry date ______ Signature ______
Name ______ Address ______
______ Postcode ______

SU4

MELBOURNE HOUSE PUBLISHERS

A year ago this month

A YEAR AGO the first issue of *Sinclair User* was published to meet the demand from a growing number of owners of Sinclair ZX-80 and ZX-81 machines. As it was a new market, the first moves were cautious and only 32,000 were printed of that first issue. It sold out and the success of *Sinclair User* was assured.

We thought of marking our first anniversary with a special magazine but then realised that the formula which had made us successful should be disturbed only for an especially major event. Though our first birthday is important, it is not important enough to stop the regular flow of news, views and reviews.

Thus we have limited its mention to the columns of Sinclairvoyance and a special anniversary offer on the price of the ZX printer, details of which can be seen on page 67.

We have taken the opportunity, however, to change the style of presentation of articles. We have done so because, despite the increasing size of the magazine, important items have still had to be omitted or postponed because of the lack of space. The new format will allow us to put more information on to each page.

During our first year we received many complimentary comments from readers and advertisers. From the large number



of letters we can quote from only a few but typical of the things you have had to say about us are those printed here.

Derek Reid from Dublin writes: "I must congratulate you on publishing such a good magazine. The articles are very interesting and the reviews and programs are excellent."

Sheldon Kenton of Whyteleafe, Surrey had this to say: "Before I had my ZX-81 I had already been buying *Sinclair User* for three issues and was very impressed with what I saw. I also found your Starting from Scratch articles extremely useful".

Our advertisers similarly have been keen to express their appreciation.

"Our recent advertisements in *Sinclair User* have proved so successful that I have now shelved all plans for advertising in any other magazine," was the view of Bob Benchley of R and R Software.

Dave Looker of DJL Software made the following comment: "I never cease to be amazed by the world-wide coverage provided by your magazine."

Finally Nigel Searle, managing director of Sinclair Research had this to say. "As reflected by the extraordinary growth in its circulation *Sinclair User* has met a significant need among our customers for a constant flow of product information and applications and, on its first anniversary, we wish it continued growth and success."

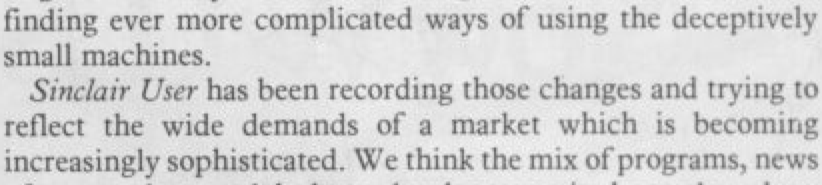
We have, of course, had our critics, particularly about the program listings. Since obtaining our dot matrix printer we have improved the listings for the ZX-81 programs and we will be doing the same for the Spectrum when a Centronics interface is available.

All the other criticisms are examined and we are always interested to consider ways of improving our service to readers. Our most recent recruits have been Quentin Heath and Zak. Heath has taken over the Mind Games column from Philip Joy and Zak draws our cartoon strip, Sinclair Simon. Both are interested in hearing your views.

There have been many changes in the Sinclair market during our first year, all of them connected with the growing popularity of home computing and the leading position of the Sinclair machines. Many of the small companies which began providing software and hardware add-ons as a sideline have found business so good that they have started doing the work full-time and are finding ever more complicated ways of using the deceptively small machines.

Sinclair User has been recording those changes and trying to reflect the wide demands of a market which is becoming increasingly sophisticated. We think the mix of programs, news of new products and the latest developments in the market, along with advice on how to obtain the most from your machine and items of general interest, is about correct.

We are concerned, however, to improve the service we can offer and decided to set up the *Sinclair User* Road Show. It will



be based on the usual stand we have had a number of shows in the last year, at which we have sold magazines and displayed some of the games we have published.

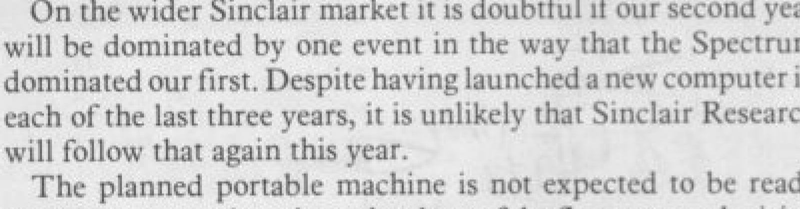
The major addition will be a series of problem-answering sessions by some of our contributors. Readers will be able to visit us with their difficulties, be they hardware or software, and we will give any advice we can.

We shall be testing the idea at the Bristol Hobbyist Fair being held on Saturday, March 19.

On the wider Sinclair market it is doubtful if our second year will be dominated by one event in the way that the Spectrum dominated our first. Despite having launched a new computer in each of the last three years, it is unlikely that Sinclair Research will follow that again this year.

The planned portable machine is not expected to be ready until next year, when the technology of the flat-screen television and the Microdrive will have been fully tested. One possible expansion is that the machine being developed for the U.S. market, the TS 1500, an improved ZX-81, might be sold here.

Of more immediate interest is the long-awaited Microdrive. As mentioned in our news pages, it has been further delayed. Early April is the latest date which was being talked about but



that is already three months behind the original final date given when it was first announced last April.

It is understood that the latest problem relates to the type of tape being used. It is thought that the original tape which was believed to be suitable has shown signs of stretching.

No doubt this year there will be a number of competitors arriving. The Oric is already here and appears to be doing well, along with the Dragon. As for the others, we shall wait and see if they can begin production in the numbers necessary to provide a real challenge to the established leader.

In the meantime, we promise to continue to provide all the information you want on the Sinclair scene.

You know that Sinclair software is easily affordable. Now W.H.Smith make it easily available.



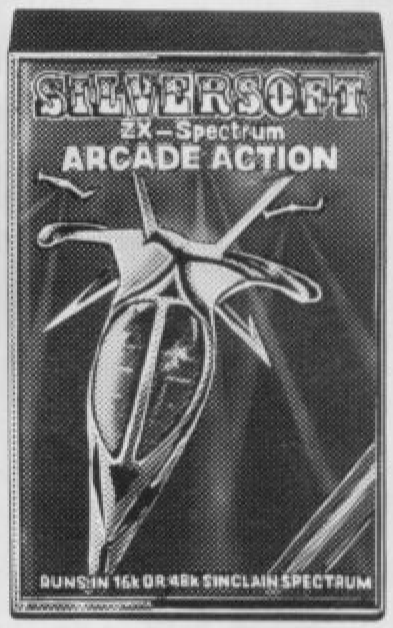
Meteor Storm
Quicksilva
16K £4.95



Escape
New Generation
16K £4.95



Ground Attack
Silversoft
16K £5.95



Orbiter
Silversoft
16K £5.95



Space Raiders
Sinclair
16K £4.95



Flight Simulation
Sinclair
48K £7.95



Horace Goes Skiing
Sinclair
16K £5.95



Battle of Britain
Microgame
48K £5.95

When it comes to software for the Sinclair Spectrum, there's no question who's right up your street. W.H. Smith.

Our range already covers some 65 programs. And it's growing fast.

So fast that every month we select and illustrate a Top Ten to keep you informed of the programs which are proving to be the most popular.

If on the other hand you've already got the Top Ten then why not come in and browse through the rest of our range.



Chess
Sinclair 48K
£7.95

The Hobbit
Sinclair 48K
£14.95 Double Tape plus book

W. H. Smith Spectrum Software Library
(all 16K programs will run on 48K machines)

Title	Producer	K RAM	Price
Arcade Games			
Space Intruders	Quicksilva	16	£4.95
Time Gate	Quicksilva	48	£6.95
Mined Out	Quicksilva	48	£4.95
Gulpman	Campbell	16	£4.95
Spectral Invaders	Bug-Byte	16	£5.00
Avenger	Abacus	16	£4.95
Meteoroids	Softek	16	£4.95
Planetoids	Sinclair	16	£4.95
Hungry Horace	Sinclair	16	£5.95
Mazeman	Abersoft	16	£4.95
Nightflight	Hewson	48	£5.95
Ground Force Zero	Titan	16	£5.00
Caterpillar	CDS	16	£5.95
Leapfrog	CDS	16	£5.95
Gobble-A-Ghost	CDS	16	£5.95
Centi-Bug	DK Tronics	16	£4.95
3D-Tanx	DK Tronics	16	£4.95
Penetrator	Melbourne Hse	48	£6.95
Cruising	Sunshine	16	£4.95
Arcadia	Imagine	16	£5.50
Derby Day	Computer Rentals	16	£5.95
Jackpot	Computer Rentals	16	£4.95
3D-Tunnel	New Generation	16	£4.95
Gobbleman	Artic	16	£4.95
Galaxians	Artic	16	£4.95
Sentinal	Abacus	16	£4.95
Cyber Rats	Silversoft	16	£5.95
Strategy Games			
Novotnik Puzzle	Phipps	16	£4.95
Chess	Artic	48	£9.45
Voice Chess	Artic	48	£9.95
Football Manager	Addictive	48	£6.95
Chess-The Turk	Oxford	48	£8.95
Adventure			
Labyrinth	Axis	16	£5.95
Planet of Death	Sinclair	48	£6.95
Inca Curse	Sinclair	48	£6.95
Ship of Doom	Artic	48	£6.95
Espionage Island	Artic	48	£6.95
The Orb	Computer Rentals	48	£5.95

Title	Producer	K RAM	Price
Utility			
M/C Code Test Tool	Oxford	16	£9.95
Compiler	Softek	16	£14.95
Family Games			
Reversi	Sinclair	16	£7.95
Othello	CDS	16	£5.95
Golf	R and R	16	£3.75
Conflict	Martech	48	£11.95
Practical			
Vu-Calc	Sinclair	16	£8.95
Vu-File	Sinclair	16	£8.95
Vu-3D	Sinclair	48	£9.95
Collectors Pack	Sinclair	48	£9.95
Club Record Controller	Sinclair	48	£9.95
Address Manager	Oxford	16	£8.95
Dietron	Custom Data	16	£4.75
Program Collections			
Shiva Special 1	Shiva	16	£5.95
Over The Spectrum 1	Melbourne Hse	16	£5.95
Over The Spectrum 2	Melbourne Hse	16	£5.95
Over The Spectrum 3	Melbourne Hse	16	£5.95

WHSMITH

Prices correct at time of going to press. Subject to availability. At selected branches only.

Personal Software Services

Step into the unknown with

THE FUTURE MAKERS

Arcade Style Games for the ZX81 16K and Spectrum

GHOST HUNT
Gobble your way through a maze - Ghosts, power pills etc. All machine code. Super fast action.
SPECTRUM 16-48k £4·95
ZX81 16K £3·95

MAZE DEATH RACE
Drive through a giant maze, 9 times the size of the screen, picking up points as you go - but watch out for the the other cars, rocks oil and ice. Superb machine code game. Highly recomended.
SPECTRUM 48K £4·95
ZX81 16K £3·95

KRAZY KONG
All machine code version of the popular arcade game. This program has all the features of the original and is every bit as fast. 3 different screens make it difficult to beat.
ZX81 16K £3·95

HOPPER
Entirely written in machine code, This excellent version of the arcade game is very addictive. See if you can get the frogs back to the lilly pond. (Available end of February 1983).
ZX81 16K £3·95

PSS makes Machine Code Redundant!



Now there is no need to spend long tedious hours writing and debugging your programs in laborious machine code - let MCoder from PSS do all the hard work for you....

MCoder is the first real integer compiler for The Sinclair Spectrum. This very sophisticated piece of software will simply translate basic programs into machine code for you, giving an average speed improvement of the order of 75 times although in certain cases the improvement can be as much as 900 times faster.

MCODER WAS DESIGNED TO BE AS SIMPLE AS POSSIBLE TO USE....

1 Load MCoder.

2 Write or load your basic program as normal.

3 RUN and debug your basic program

4 Compile your program using a single print USR command. If you have made a mistake MCoder will tell you exactly where, allowing you to correct it before it is too late.

As an additional feature basic programs can be compiled and "Stacked" above each other in memory - giving you true flexibility in your programming.

MCODER FOR THE SPECTRUM (16K or 48K) Costs only **8·95**

THE ZX81 VERSION IS ONLY **7·95**

Enter The PSS *COMPETITION

To show our faith in our product we are offering £1000 in prizes for the best Spectrum programs using MCoder. They can be GAMES, EDUCATIONAL, UTILITIES, in fact anything you care to write — The only restriction we make is that they must be written using MCoder.

1st. prize - £500

2nd. prize - A PORTABLE COLOUR TV VALUED AT £250

10 runners up - WILL EACH RECIEVE A PRIZE OF £25

WE ALSO GUARANTEE TO MARKET THE TWO WINNING PROGRAMS UNDER A ROYALTY AGREEMENT WITH THE AUTHOR. * CLOSING DATE 31st MAY. RESULTS WILL BE PUBLISHED IN SINCLAIR USER MAGAZINE. ENTRY FORM ENCLOSED WITH EVERY COPY OF MCODER.

SEND CHEQUE OR P.O. TO PSS 452 STONEY STANTON ROAD COVENTRY CV6 5DG.

The Sinclair User Club

This month's offer includes a wide variety of cassettes covering sport and adventure

Save 30 percent on top games programs

THE CLUB OFFER this month consists of a variety of games ranging from arcade action to graphics simulations of popular sports and space adventure.

The software house R and R started several months ago as a small company selling games which run on the ZX-81. At first it advertised in the Supermarket section of *Sinclair User* but when it began to sell Spectrum games it struggled to keep pace with orders.

With the release of **Spectrum Golf,** R and R went into an area in the market where few others had gone — outdoor games simulation. The cassette was an immediate success and it is still regarded as one of the best versions of golf running on a microcomputer.

The golf course on which the player struggles to keep to par is shown from a high vantage point and includes all the dangers, such as trees, lakes, and the rough, as well as the green and the hole. It is possible to choose from a limited number of clubs and directions are determined by using a clock face, rather like when flying an aircraft.

The company produced a version of **Star Trek** which started the move away from copying the original mainframe computer version and introduced some interesting graphics. Star Trek was followed by another old favourite for the Spectrum, Pacman, which R and R, known for its originality, named **Gnasher.** The Club is offering 30 percent off all these games.

Saturn Developments is supplying its excellent and inventive space adventures at a discount of 30 percent to club members. With this exclusive offer you can send for **Mines of Saturn** and **Return to Earth,** which is the sequel to the first game. The normal price of both games, which are available for the Spectrum and ZX-81, is £5.50, so the discount offered is substantial.

This month's reductions are shown below. As usual, we make two special offers and this month we have been able to obtain a special 30 percent reduction on retail prices exclusively for club members.

R and R can be contacted at 34 Bourton Road, Tuffley, Gloucester.

Saturn Developments can be reached at Dept PK, 37 Heol Durlais, Birchgrove, Swansea SA7 9LT.

New members of the club will be able to take advantage of the offers before they have been registered as club members. All you have to do is send your order with the membership form. In that way you can take advantage of any offer and join the club.

This month we are offering both the R and R and Saturn Developments full ranges of products. Both companies are major software houses and an offer like this is a priority.

R and R Software	**Usual price**	**Offer price**
Golf '81	**£3.75**	**£2.62**
Golf (Spectrum)	**£3.75**	**£2.62**
Gnasher (16K Spectrum)	**£4.95**	**£3.45**
Star Trek (48K Spectrum)	**£4.95**	**£3.45**
Saturn Developments	**Usual price**	**Offer price**
Mines of Saturn	**£5.50**	**£4.85**
Return to Earth	**£5.50**	**£4.85**

Cassettes on the high seas

SINCLAIR USER CLUB cassettes are finding their way in and around some of the most unlikely places.

Member Alan Thomas is a merchant seaman and takes his computer on all his voyages. On his last voyage which lasted five weeks he took his club cassette with him.

One of the games on the cassette is Oxo, a simple enough game, you may think. Not so, says member Thomas; the ZX-81 almost melted from continuous use by almost every member of the crew being addicted to the game, including the captain.

When we asked him if anybody beat the computer he replied: "I beat it twice while the captain managed to beat it only once."

We are now wondering if Thomas will want to take our latest club cassette with him on his next voyage. One of the games on the cassette is Missile.

Incidentally, Thomas contacted us originally with a technical problem on the

continued on page 10

MEMBERSHIP FORM

I wish to join the Sinclair User Club and enclose my subscription of £12

Name . . . .
Address . . . .
. . . .
. . . .
. . . .

Which computer do you own?

ZX-81 ☐ Spectrum ☐

Send your coupons to Sinclair User Club, ECC Publications, 30-31 Islington Green, London N1 8BJ. Cheques should be made payable to Sinclair User Club.

Sinclair User Club

continued from page 9

telephone help line, which is just one of the club facilities.

The number for the help line is included in the cassette newletter, which is sent to members every two months. The cassette also has news and tips to help members make the most of their machines.

Other features of our growing User Club are regular special offers by which members can obtain large discounts on a wide range of software and hardware items. The latest offer can be seen on the previous page.

Another feature is a cassette recorder head-alignment service. For a small fee we offer to improve cassette players so that loading and saving is improved.

All those benefits can be obtained by filling-in the coupon on the previous page, being careful to inform us which machine you own so that the correct cassette can be sent.

Britain

Aylesbury ZX Computer Club: Ken Knight, 22 Mount Street, Aylesbury (5181 or 630867). Meetings: first Wednesday and third Thursday of the month.

Colchester Sinclair User Group: Richard Lown, 102 Prettygate Road, Colchester CO3 4EE.

Doncaster and District Micro Club: John Woods, 60 Dundas Road, Wheatley, Doncaster DN2 4DR; (0302) 29357. Meetings held on second and fourth Wednesday of each month.

Eastwood Town Microcomputer Club: E N Ryan, 15 Queens Square, Eastwood, Nottingham NG16 3BJ.

Edinburgh ZX Users' Club: J Palmer (031 661 3183) or Ken Mitchell (031 334 8483). Meetings: second Wednesday of the month at Claremont Hotel.

EZUG-Educational ZX-8081 Users' Group: Eric Deeson, Highgate School, Birmingham B12 9DS.

Furness Computer Club: R J C Wade, 67 Sands Road, Ulverston, Cumbria (Ulverton 55068). Meets every other week on Wednesday evenings.

Glasgow ZX8081 Users' Club: Ian Watt, 107 Greenwood Road, Clarkston, Glasgow G76 7LW (041 638 1241). Meetings: second and fourth Monday of each month.

Gravesend Computer Club: c/o The Extra Tuition Centre, 39 The Terrace, Gravesend, Kent DA12 2BA. Bi-monthly magazine and membership card.

Hassocks ZX Micro User Club, Sussex: Paul King (Hassocks 4530).

Inverclyde ZX-81 Users' Club: Robert Watt, 9 St. John's Road, Gourock, Renfrewshire PA19 1PL (Gourock 39967). Meetings: Every other week on Monday at Greenock Society of the Deaf, Kelly Street, Greenock.

Keighley Computer Club: Colin Price, Redholt, Ingrow, Keighley (603133).

Lambeth Computer Club: Robert Barker, 54 Brixton Road, London SW9 6BS. Interest in educational software. Once running, will be affiliated to the Association of London Computer Clubs.

Liverpool ZX Users' Club: Keith Archer, ZX Computer Centre, 17 Sweeting Street, Liverpool 2. Meetings every Wednesday, 6.30 to 9.30 pm.

Merseyside Co-op ZX Users' Group: Keith Driscoll, 53 Melville Road, Bootle, Merseyside L20 6NE; 051-922 3163.

Micro Users' Group: 316 Kingston Road, Ewell, Epsom, Surrey KT19 0SY.

National ZX-80 and ZX-81 Users' Club: 44-46 Earls Court Road, London W8 6EJ.

Newcastle (Staffs) Computer Club: Meetings at Newcastle Youth and Adult Centre, Thursday, 7.30 to 10.00pm. Further information from R G Martin (0782 626065).

North Hertfordshire Home Computer Club: R Crutchfield, 2 Durham Road, Stevenage; Meetings: first Friday of the month at the Settlement, Nevells Road, Letchworth.

Northern Island Sinclair Users' Club: R Gibson, 11 Fitzjames Park, Newtownards, Co Down BT23 4BH.

North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 each Monday, 6pm.

Nottingham Microcomputer Club: ZX-8081 users' group, G E Basford, 9 Holme Close, The Pastures, Woodborough, Nottingham.

Orpington Computer Club. Roger Pyatt, 23 Arundel Drive, Orpington, Kent (Orpington 20281).

Perth and District Amateur Computer Society: Alastair MacPherson, 154 Oakbank Road, Perth PH1 1HA (29633). Meetings: third Tuesday of each month at Hunters Lodge Motel, Bankfoot.

Regis Amateur Microcomputer Society: R H Wallis, 22 Mallard Crescent, Pagham, Bognor Regis, West Sussex PO21 4UU.

Scunthorpe ZX Club: C P Hazelton, 26 Rilestone Place, Bottesford, Scunthorpe; (0724 63466).

Sheffield ZX Users' Club: A W Moore, 1 Ketton Avenue, Sheffield S8 8PA, Yorkshire. Annual subscription Ï0, monthly newsletter and cassette.

Sittingborne: Anurag Vidyarth (0795 73149). Would be interested to hear from anyone who wants to start a club near the Medway towns.

Stratford-on-Avon ZX Users' Group: Chris Parry, 16 Sackville Close, Stratford-on-Avon, Warwickshire.

Swansea Computer Club: B J Candy, Jr Gorlau, Killay, Swansea (203811).

Swindon ZX Computer Club: Andrew Bartlett, 47 Grosvenor Road, Swindon, Wilts SN1 4LT; (0793) 3077. Monthly meetings and library.

Worle Computer Club: S W Rabone, 18 Castle Road, Worle, Weston-super-Mare BS22 9JW (Weston-super-Mare 513068). Meetings: Woodsprings Inn, Worle, on alternate Mondays.

ZX-Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH. Please include sae. Meetings twice monthly.

ZX Guaranteed: G A Bobker, 29 Chadderton Drive, Unsworthy, Bury, Lancashire. Exchanges information and programs throughout the country.

ZX-80/ZX-81 Users' Club: PO Box 159, Kingston-on-Thames. A postal club.

Overseas

Belgian National Sinclair Users' Club: P Glensson, Rue Abbe De l'Epıeestraat, 14, 1200, Brussels.

Belgium, France, Luxembourg: Club Sinclair, Raymong Betz, 38 Chemin du Moulin 38, B-1328 Ohain, Belgium (322 6537468).

Belgium, Netherlands: Microcomputer Vereniging BZW, Paul Glenisson, Priester de l'Epıeestraat 14, B-1200 Brussels, Belgium (322 7349954).

Denmark: Danmarks National ZX-8081 Klub (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelese, post giro 1 46 24 66.
ZZ-Brugergruppen i Danmark, Boks 44, 2650 Hvidovre, Gratis medlemskab og gratis blad til enhver interesseret.

East Netherlands: Jonathon Meyer, Van Spaen Straat 22,6524 H.N. Nijmegen; (080 223411).

Germany: ZX-80 Club, a postal club; contact Thomas Jenczyk. Hameln, Postfach 65 D-3250 Hameln, Germany.

Indonesia: Jakarta ZX-8081 Users' Club, J S Wijaya, Jakarta, Indonesia.

Irish Amateur Computer Club: Martin Stapleton, 48 Seacourt, Clontarf, Dublin 3. (331304).

Republic of Ireland: Irish ZX-8081 Users' Club, 73 Cnoc Crionain, Baile Atha, Cliath 1.

Singapore: Sinclair Users' Group: Eric Mortimer, 1D Wilmer Court, Leonie Hill Road, Singapore.

South Africa: Johannesburg ZX8081 Computer Users' Club: S Lucas, co Hoechst SA (Pty) Ltd, PO Box 8692, Johannesburg.
Johannesburg ZX Users' Club: L*fenn*f*ert* ER Fisher, PO Box 61446, Marshallstown, Johannesburg.

Spain: Club Nacional de Usuarios del ZX-81, Joseph-Oriol Tomas, Avda. de Madrid, No 203 207, 10, 3a esc. A Barcelona-14 Espana. International ZX Spectrum Club: Gabriel Indalecio Cano, Sardana, 4 atrico 2a, San Andres de la Barca, Barcelona. Send international reply coupon. Produces a bi-monthly magazine. Spanish ZX Micro Club: Apartado 181, Alicante (Costa Blanca), Spain.

United States: Bay Area ZX-80 User Group, 2660 Las Aromas, Oakland CA94611. — Harvard Group, Bolton Road, Harvard MA 01451; (617 456 3967).

"IT LOOKS NICE BUT WHAT THE HELL CAN I DO WITH IT?"

Every ZX SPECTRUM Print'n'Plotter Jotter has 100 pages of finely printed screen grids.

50 for the high resolution screen. 50 for the normal character screen.

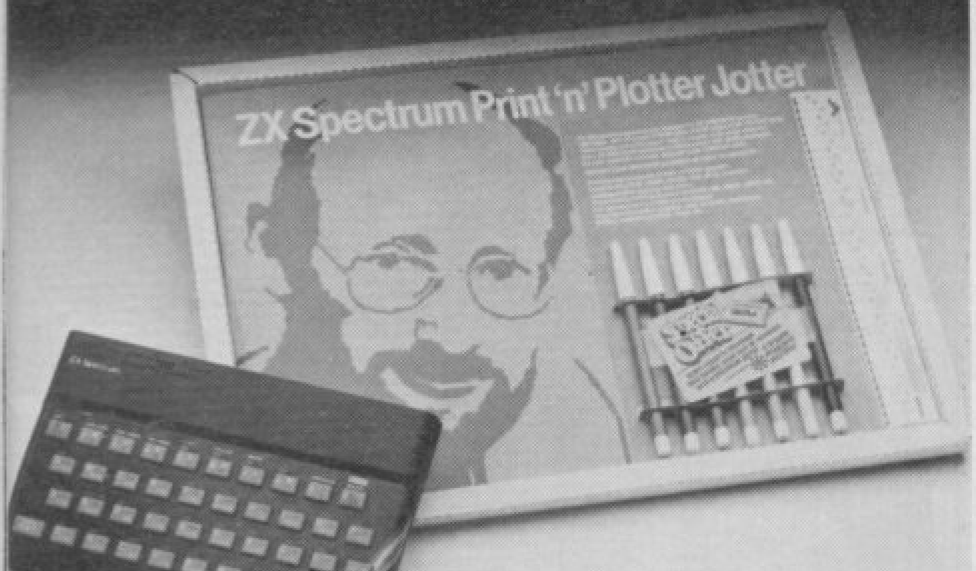
With these at your disposal you can plan practically any graphics print-out to program into your computer.

The high-resolution PLOT grid shows every one of the 45,060 pixels! Every one printed. Every one with its co-ordinate numbers. This gives you enormous graphics power to DRAW, PLOT, CIRCLE, PLOT OVER and so on in any position or screen building up graphic drawings, charts, maps ... in fact anything without the complications of guesswork, integer out of range, or wrongly positioned pixel colours which change PRINTed INK characters!

The normal character PRINT grids on the other hand will allow you to be specific about PRINT AT, TAB, PRINT OVER, SCREEN$ and INK/PAPER in direct co-ordination with PLOT ... you see every page is printed on **high quality tracing paper** ... ideal to overlay on to illustrations and 'copy' or co-ordinate.

And there's another bonus, because each page contains 24 User-definable grids — **2400 per pad!**

With 50 pages of PLOT grids, 50 pages at PRINT grids 2400 user-definable grids, a set of colour pens, a printed PIXEL RULER and our Special Offer of demo programs, IT'S THE BEST VALUE IN ZX GRAPHICS PROGRAMMING.



"PRINTER PAPER THAT WORKS? I DON'T BELIEVE IT!"

Five rolls of our PRINTER PAPER will only cost you £10.95. And you will gain a great deal more! It prints beautifully. It's not too thick. It's not too shiny. Print is black — not grey. It actually feeds through the machine! See for yourself. Only £10.95 for 5 rolls. Beware of expensive imitations!



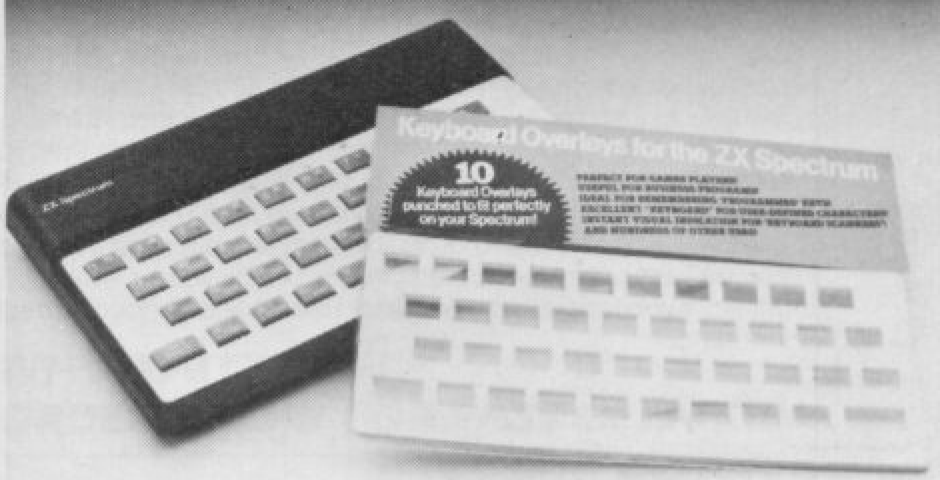
"NOW WHICH KEY DO I PRESS TO SHOOT DOWN THE THING FROM MARS?"

Ever forgotten which key to press when playing a game? Do you suffer from a mind-boggling mass of programmed keys? Do you write programs that use different keys to perform various functions? If so, we have just the thing for your ZX SPECTRUM.

A pack of Print'n'Plotter Keyboard Overlays.

Just write the function or functions under each key you program and keep the overlay for the next time you play the game. Of course there's lots of more uses you will find for our OVERLAYS, user defined characters, keyboard scanners, mathematical programs, business uses — to name just a few.

There's TEN OVERLAYS to a pack — so you can program with impunity! And they fit perfectly onto your standard ZX SPECTRUM KEYBOARD. Each OVERLAY is printed with the cursor movement key directions and there's room for program name etc.



"ZX81 GRAPHICS BETTER THAN SQUIGGLES AND BLOBS?"

Disappointed with ZX81 Graphics? Perhaps you haven't explored the vast possibilities.

Why not invest in a ZX81 JOTTER, FILM and our guide "ZX81 Graphics programming made easy"?

The JOTTER is a 100 page pad of PRINT grids and PLOT grids with all numbered co-ordinates. The FILM is a re-usable matt transparent polyester version of the grids which can be drawn-on and used again ... ideal for overlaying and copying.

The 24 page full colour guide will show you how to use the JOTTER and FILM to produce perfect low resolution graphics on your ZX81!

So stop squiggling. Get a set now!



"WHERE CAN I GET THEM?"

Post now or call at one of our retailers!
Post to Print 'n' Plotter Products, 19 Borough High St., London SE1 9SE.

Name: ....

Address: ....

....

.... 5

.... ZX SPECTRUM JOTTER @ £9.95 each.
.... ZX SPECTRUM KEYBOARD OVERLAYS @ £2.95 per pack
.... ZX SPECTRUM DEMO CASSETTE @ 95p each.
.... ZX81 JOTTER PADS @ £3.50 each.
.... ZX81 FILMS @ £2.25 each.
.... ZX81 "GRAPHICS PROGRAMMING GUIDE" @ £1.50 each.
.... ZX PRINTER PAPER @ £10.95 per five rolls.

Remittance enclosed. Please bill my Access/Barclaycard/Visa/Mastercard No:

....

Please note: Price quoted include VAT, P&P for UK deliveries.
Overseas order please add 25% for additional Surface Mail.

Print'n'Plotter Products

You can see and buy most of our products at
W. H. Smith (Computer Stores)
Buffer Micro (Streatham)
Microware (Leicester)
Dennys Bookshops (London EC1)
Personal Computer Services (Darwen, Lancs)
Telford Electronics & Computing (Shifnall)
Georges Bookshop (Bristol)

dk'tronics

ZX KEYBOARD FOR USE WITH 80/81 SPECTRUM

Our new cased keyboard has 52 keys, 12 of these are used for the numeric pad. The numeric pad offers some useful features, you can cursor with one hand and it will be a boon for anyone who enters a lot of numeric data. The pad is a repeat of the 1-9 keys plus it has a full stop and a shift key. The numeric pad keys are coloured in red, the normal keyboard keys are grey, with the case being black which makes the whole thing very attractive. The case measures 15 × 9 × 2½. The computer (either 80/81 or spectrum) fits neatly inside. You will have to remove the computer from its original case, it is then screwed to the base of the case. The case had all the bosses already fitted and the screw holes are marked. Also fitted inside the case is a mother board (81 model only) which allows 16K, 32K and 64K to be fitted in the case. All the connections are at the rear of the case i.e. Power, Mic, Ear, T.V. and the expansion port. The case is large enough for other add ons also to be fitted inside. One of these could be the power supply, then you could very quickly fit a mains switch, or a switch on the 9V line. This means you have a very smart self-contained unit. This case does not stop you from using any other add-ons that you may have e.g. Printer etc. We are convinced that this is the best keyboard available at present. It offers more keys and features than any other keyboard in its price range.

£45



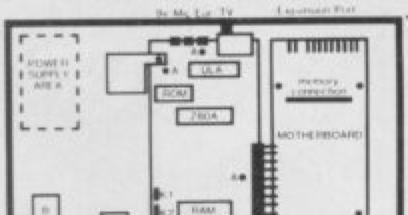
NOTE

The case can be purchased separately with the keyboard aperture uncut, so if you have one of our early uncased keyboards, or in fact any other suppliers' keyboards, these could be fitted. The keyboard is connected to your computer by a ribbon cable and this has connectors fitted which simply push into the Sinclair connectors. It is a simple two minute job and requires no electronic skills. This keyboard does not need any soldering. Please specify on order whether you require the ZX 81 or Spectrum case.

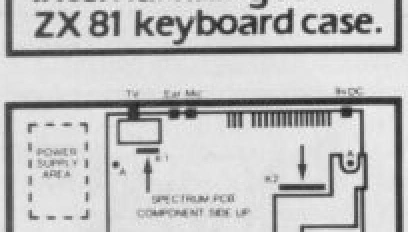
SPECTRUM MODEL

This is supplied with spectrum legends, and a slightly different base for fitting the spectrum inside, again all the connectors are at the rear of the case and there is plenty of room for the power supply (and other add-ons). Should you want to change, we can supply both the Spectrum legends and details of updating your case which will enable modification from the ZX 81 to spectrum. PLEASE specify on your order whether you require the ZX 81 or spectrum case.

KEYBOARD (SPECTRUM/81)



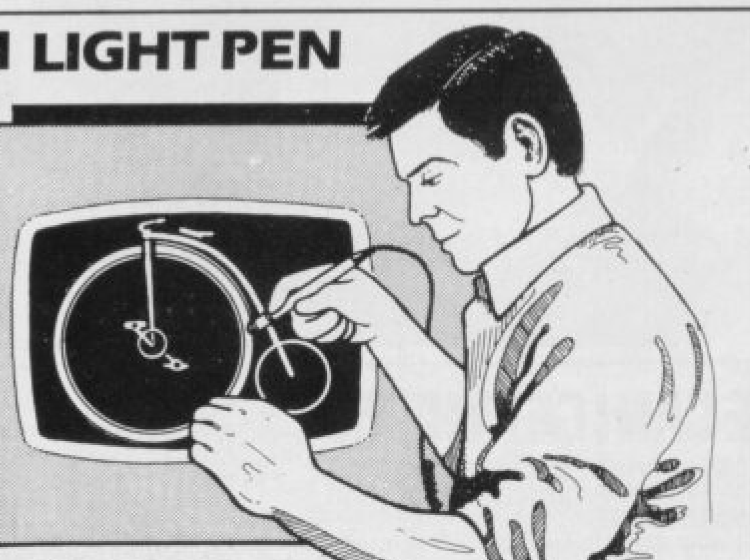
Internal fixing for ZX 81 keyboard case.



Internal fixing for spectrum keyboard case.

SPECTRUM LIGHT PEN

The pen enables you to produce high resolution drawings on your own television set, saving a vast amount of time over using basic programming statements, such as Plot, Draw etc. You can erase, modify and save drawings and it comes complete with software program. The superb light pen is available from D.K. tronics.



£19.95

SPECTR

16K Memory Ex
The 16K uses 4116 Static Ram and occ using the Static Ra speed low power the computer. All which comes to y where. Position in

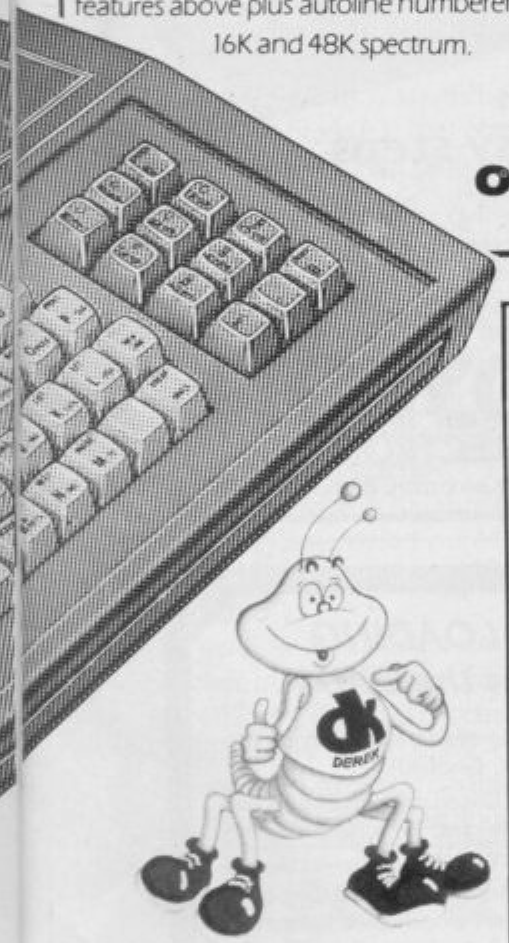
64K Memory Ex
All the above info advantage lies in t 56K of usable mem the use of other a 8192-65536. The E
Spectrum Memo
Upgrade your Spe it is simply slipped are supplied, and time. The fitting re same as Sinclair's

ZX 80~81 Spectrum HARDWARE

SPECTRUM/81 TOOLKIT

This is the toolkit which won acclaim in the feature in the August 1982 issue (pages 29 and 30) of Sinclair User. "It is the most impressive program, fast in execution with clear and full instructions...it stands out from the rest of the field." The ZXED is a powerful editor for use on the expanded ZX81. It is intended for use by the serious BASIC programmer and offers several useful and time saving features most helpful during all stages of program development. The facilities provided are as follows: ALTER, BYTES, COPY, DELETE, FIND, HELP, INSERT, KEEP, MOVE, RENUMBER AND VERIFY. The Spectrum Toolkit contains most of the features above plus autoline numberer and append, and will run in the 16K and 48K spectrum.

Both at only £6.95



4K GRAPHICS ROM £24.95

The DK Graphic module is our latest ZX 81 accessory. This module unlike most other accessories fits neatly inside your computer under the keyboard. The module comes ready built, fully tested and complete with a 4K graphic ROM. This will give you an unbelievable 448 extra pre-programmed graphics, your normal graphic set contains only 64. This means that you now have 512 graphics and with their inverse 1024. This now turns the 81 into a very powerful computer with a graphic set rarely found on larger more expensive machines. In the ROM are lower case letters, bombs, bullets, rockets, tanks, a complete set of invaders graphics and that only accounts for about 50 of them, there are still about 400 left (that may give you an idea as to the scope of the new ROM). However, the module does not finish there, it also has a spare holder on the board which will accept a further 4K of ROM/RAM. This holder can be fitted with a 1K/2K/RAM and can be used for user definable graphics so you can create your own custom character sets.

WHY WAIT?
ORDER TODAY FOR FAST DELIVERY

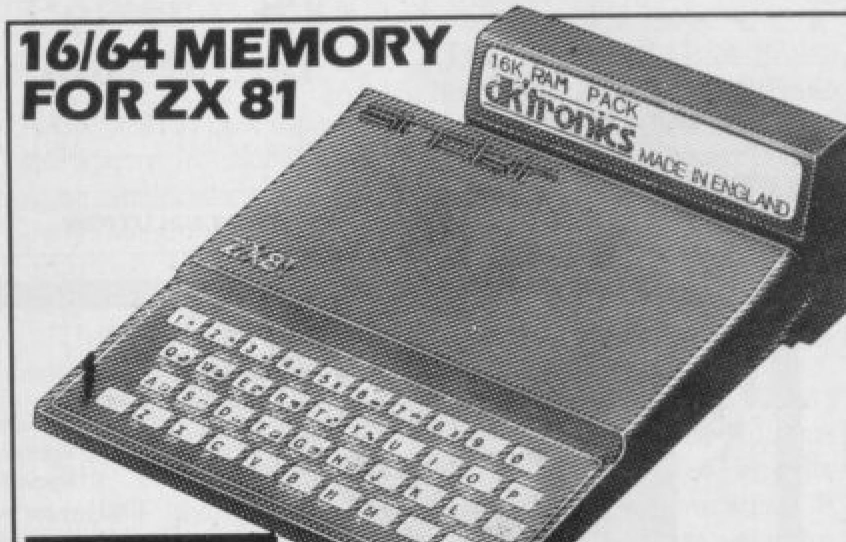
FLEXIBLE RIBBON CONNECTOR

If you have ever had whiteouts or system crashes this could be the answer. It stops the movement between the computer and the RAM expansion, it is supplied with a ribbon, 6 inches long, with a male connector at one end and a female at the other, at only

£10



16/64 MEMORY FOR ZX 81



16K Memory £22.95
16K (uncased) £19.95
64K Memory £52.95
64K (uncased) £49.95

The above illustration shows the casing for the 16K or massive 64K.

R...UM MEMORY

...pansion £22.95

Ex... Dynamic Ram Chips. We use the dynamic as they are much denser than 116... ...upy less space. They are also much cheaper than the equivalent product occ...m. The Ram is manufactured with high quality materials, and uses high Ra...ams. It is supplied ready-built and only needs to be plugged into the rear of ver... the components are fitted into holders. This massive add-on memory All...ou fully assembled and tested is the cheapest 16K memory available any-o y... memory from 16384 to 32768. (Same as the Sinclair memory.) n ir...

16K (UNCASED) £19.95

...pansion £52.95

Ex...rmation on the 16K also applies to the 64K Memory Expansion, but the nfc...he 64K giving nearly FOUR times the memory. This advanced model has in t...ory. In addition, the block from 8K to 16K can be switched out to enable mer...dd-ons. The graphics ROM is to be used in this area. Position in Memory: er a...lock From 8192-16384 is switchable. ne E...

64K (UNCASED) £49.95

...ry Expansion £35.00

Spe...ctrum to 48K of user Ram. The Spectrum memory expansion is simple to fit, ed...nside the case, and then only requires plugging in. Full fitting instructions nd...he only tool you will need is a screwdriver and just two minutes of your g re...quires no electronic skills. Position in memory from 32768 to 65536. (The r's...upgrade to 48K).

Please state type of machine, which Rom memory size, quantity and place when ordering

Please send me . . . . @ £ . . . .

Please send me . . . . @ £ . . . .

Please send me . . . . @ £ . . . .

Please add on £1.25 for P/P

In enclose cheque/P.O. payable to DK Tronics total £ . . . .

or debit my Access/Barclaycard

Signature . . . .

Name . . . .

Address . . . .

Send to DK Tronics, 23 Sussex Road, Gorleston, Gt. Yarmouth, Norfolk.
Tel: Gt. Yarmouth (0493) 602453

dk'tronics

New colour brochure now available, send SAE for quick return

SPECTRUM NEWS FROM ELR

EAST LONDON ROBOTICS

Just received your Issue 2 Spectrum? No point in looking any further – we have the products you need at the prices you expect.

SP48

32K Memory extension
(giving total of 48K. Upgradeable to SP80)

£25

SP80

64K Memory extension
(giving massive 80K)

£50

Both the SP48 and the SP80 fit inside the Spectrum case, are fully compatible with all Sinclair add-ons (ZX Printer, RS232, Microdrive etc.), are very low in power consumption, require no soldering, are easy to fit and remove and carry our full guarantee.

Transfer your ZX81 BASIC and machine code programs and data onto your Spectrum in minutes with the fabulous new

ZX SLOWLOADER

SOFTWARE PRODUCT OF THE YEAR

£10

This superb piece of software enables your Spectrum to LOAD programs from ZX81 tapes and automatically converts them to 'Spectrumese' ready for normal Spectrum SAVEing.

ORDERS & ENQUIRIES

Send s.a.e. for **FREE** catalogue to: East London Robotics, Gate 11, Royal Albert Dock, London, E16. Tel: 01-471 3308 for 24-hr automatic information.

Prices include VAT Please tick if you require VAT receipt ☐

Please rush me Item description	Quantity	£	p
		P & P	45

I enclose cheque/PO payable to East London Robotics for TOTAL £ ______

Name: Mr/Mrs/Miss ______ Address ______

EAST LONDON ROBOTICS — THE OPTIMUM SOLUTION

ELECTRONIC klik keyboard

AN ALTERNATIVE NOT AN ADD ON

FOR ZX81



£24.95 INC VAT P+P £1.00

Installed in 3 easy steps . . .

1. Peel of the touch sensitive key pad.
2. Plug in Klik-Keyboard (no soldering) and place in position.
3. Apply self adhesive two-colour legends to the keys.

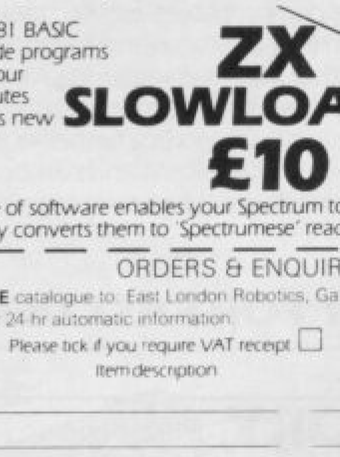
This full 40 key keyboard has a positive click feel as the keys are depressed but as it replaces the original touch pad it becomes a permanent part of the ZX81 without bulky boxes or trailing wires.

KEMPSTON MICRO ELECTRONICS

Dept , 180a Bedford Road, Kempston, Bedford MK42 8BL

ALL NEW!

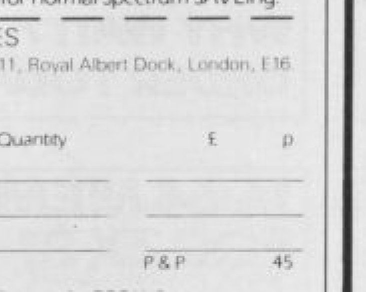
Just £4.95!



New SPACE TREK

All the features of the favourite 'Star Trek' game plus graphic warp drive and arcade type klingon shoot-out make this program a must for the dedicated 'trekker'.

New slimmer, lighter RAM Pack for the ZX81—no wobble problems, and completely reliable—fully printer compatible.



Only £26.50!

Buy the two together as a budget pack for only £29.95!

JRS SOFTWARE

19 WAYSIDE AVENUE, WORTHING, SUSSEX. BN13 3JU Telephone: (0903) 65691

Other JRS FAST LOADING 16K Programs for the ZX81

£4.95 GAMES II— 3 arcade-style machine code programs (City Bomb, 3-D Battle, Gridball).

£4.95 LOST ISLAND—An absorbing adventure program in which you are shipwrecked on a desert island.

£5.95 GRAPHICS TOOLKIT—22 machine-code routines that enable you to considerably improve the screen displays in your own programs. ('Good value for money' ZX Computing Sept/Oct Issue).

£4.95 BATTLESHIPS—The classic game of Battleships and Cruisers—You verses the ZX81.

TO JRS SOFTWARE LTD, 19 WAYSIDE AVENUE WORTHING, WEST SUSSEX BN13 3JU

Qty.	Item	Price	Total
	BUDGET PACK	£29.95	
	JRS 16K RAM Pack	£26.50	
	SPACETREK	£4.95	
	GAMES II	£4.95	
	LOST ISLAND	£4.95	
	BATTLESHIPS	£4.95	
	GRAPHICS TOOLKIT	£5.95	

☐ Please tick for free catalogue Total £

(Note all prices include VAT, p&p)

I enclose Cheque/Postal order/Money order* for £______ made payable to JRS SOFTWARE LTD

Mr/Mrs/Miss ______

Address ______

*Delete as applicable SU4

Million Sinclairs sold throughout the world

SINCLAIR RESEARCH has claimed that it is the first company to sell one million home computers throughout the world. The company is now producing one computer approximately every four seconds on the production line in Dundee.

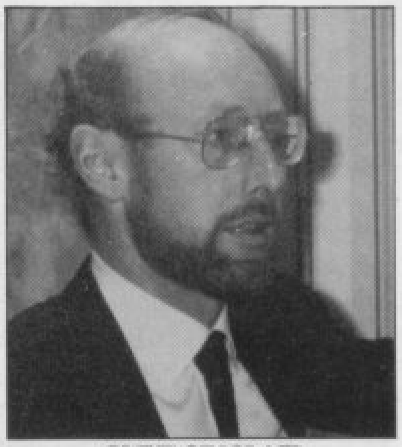
They are added to the 130,000 ZX-80s, 750,000 ZX-81s and 200,000 Spectrums already sold to users around the world.

In addition to one million Sinclair computers the company estimates that 600,000 computers have been manufactured under licence by Timex for sale in North America.

Clive Sinclair, chief executive and chairman of Sinclair Research, is very pleased with the figures. He says:

"The figures are a magnificent achievement for all concerned. With the ZX-81 entering its third year of production, the figures demonstrate beyond doubt the long-term viability of the computer as a consumer product."

The Sinclair claims are disputed by Commodore, which manufactures the Vic-20 and Vic-64 machines.



CLIVE SINCLAIR
'Magnificent achievement'

Commodore made a similar claim to that of Sinclair Research several months ago and states that it passed the one million mark last year.

Flying start for ZX-81s

INTEREST IN computers in the armed services is not concerned only with the technology of warfare. The Royal Air Force is to launch a computer association on May 7 at RAF Newton, near Nottingham.

There is wide interest in Sinclair machines and publicity officer Flight-lieutenant Otridge, says he has a ZX-81. He says: "The association is not machine-based, although most members have their own machines which they take to their local clubs. What we aim to do is to provide a worldwide link for local station clubs.

"Members from as far away as Germany and Port Stanley have become interested. We want to help existing clubs — and there are many of them — and also to interest other stations sufficiently to start a club."

Anger at growing software libraries

SOFTWARE manufacturers are becoming increasingly angry about the growth of lending libraries.

Tony Baden of Bug Byte, one of the biggest software houses in Britain, said: "We do not like these libraries at all. They are taking the royalties from authors and generally doing the industry no good."

Most companies regard software copying as stealing. Mike Meek of MikroGen said: "It is like walking into W H Smith and taking a £6 cassette without paying for it."

The lending libraries, however, insist that they are doing their best to keep on the side of the law. Steven Stones of the Software Lending Library said: "I will agree to any reasonable proposals from the software houses, as I feel that I am working on their behalf more than anyone else."

Alec Fry of the Sinclair Owners' Software Library said: "We deal only with tapes bought with the manufacturers' approval and operate only with their permission. Manufacturers benefit from our service because when a tape wears out we order more."

Power packs fault found

A BATCH of power packs for the Spectrum has been found to be dangerous and the company has mounted a major campaign to contact all the people affected.

The packs are being used with Spectrums sold since the beginning of the year and have a black and white lead.

The company says the numbers involved are relatively small, as only one supplier is involved. It also emphasises that only the power pack is involved and that the computer is safe.

Anyone with such a pack should cease to use it immediately and return it to Sinclair Research at a special depot which has been set up to deal with the problem at Unit F, Broad Lane, Cottenham, Cambridgeshire CB4 4SW.

Show date

IN OUR LAST issue we dealt with shows and exhibitions throughout the country and stated that the Northern Computer Fair was to be held on March 12. That was an error and the date should have been March 26 at the Pudsey Civic Centre, Dawson's Corner, Stanningly.

RAMCS change refused

REQUESTS by hardware manufacturers for the incorporation of a device, called a RAMCS, to allow extra ROMs to be used on the 48K Spectrum have been refused by Sinclair Research.

At the moment it is possible to put extra ROMs on to the 16K machine but, because of the way the extra 32K memory and decoders are arranged, it is impossible for such insertions to be made on the 48K Spectrum.

"The change is so simple," explained Stephen Adams, the man who put the modifications to Sinclair Research. "All that is required is a resistor and a piece of wire. The change could be incorporated into the production line or made when machines are returned for repair."

Adams also suggested that a company nominated by Sinclair Research could do the modification without invalidating the guarantee of a machine.

Manufacturers of EPROMs and other hardware add-ons are also interested in the modification, because it would allow them to sell chips to the public and also sell software in ROM. The RAMCS will also allow a second processor, such as the 6502, to be used. That is possible on the BBC microcomputer and would be an advantage on the Spectrum.

Kailafh Pandy of Cambridge Microelectronics is one of the manufacturers who would like to see the RAMCS installed. He said: "We would welcome it tremendously. We do not produce anything for the Spectrum yet because it is not possible to incorporate anything on to the board. We have heard a rumour that Timex is incorporating it on to the TS-2000 in the States and we would like it on the British version."

More news — page 16



Oric off to good start

THIS MONTH Oric International Products is due to launch a series of peripherals for its new computer, the Oric One. They include a four-colour printer, modem and the capacity for the use of microdiscs on the system.

There are no definite dates for the launch of the products but Oric claimed at its launch in January that prototypes of the devices were ready and it was only a question of starting production. The Oric was sold by mail order until March, when Oric was launched in stores such as W H Smith and Currys. Peter Harding, Oric sales director, said:

"We knew we had a good product on our hands, but its success has far exceeded our original expectations. The more than 3,000 orders received from mail order customers were dealt with by the end of February."

Microdrive delay

CLIVE SINCLAIR declined to address a meeting of the Institute of Electrical Engineers in February because a model of the Microdrive was not ready to be demonstrated at the meeting.

A representative of the company also declined the offer to attend the meeting held at the Institute's headquarters. The reason given by the chairman, Denis Flexney-Briscow, was that "the Microdrive has been delayed yet again. We promise to bring it to you later in the year, so continue to watch this space."

One of the last-moment speakers was Dr Ian Logan, author of several books on Sinclair ROMs, who has been working on the software for the Microdrive. He gave away no secrets but said:

"I may have written the software for the device but to be honest I don't know what is on the other end of the wire."

Other speakers were Andrew Hewson and Stephen Adams, who both contribute to *Sinclair User*. Hewson discussed the history of Sinclair machines and the structure of the Spectrum memory map. He also showed how a Basic program is stored in the machine.

Adams, no stranger to the hardware world, talked the audience through the various chips on the Spectrum printed circuit board and then showed the type of add-ons which can be used.

Spectrum helping in the treatment of dyslexia

THE SPECTRUM is to be used in a project to help diagnose and treat dyslexia, a disability which causes disorientation of the senses, particularly of sight, in the sufferer.

The project was started by Brother Henry, director of the Mayfield College for Boys, in 1980. At that time computers, such as the Pet and RML 380-Z, were used to produce the software, which was a result of some spare-time programming by boys at the college.

He says: "The response has been so great that it has become too great for me. I have had to delegate the responsibility to regional information centres.

"I am waiting for the Microdrive to arrive to do any further work. We think that the Spectrum is the ideal machine to use in this type of work because it is possible for most people to buy one.

For more information on the project, telephone 0435 872031 during office hours.

Sinclair Research structure

TO CONTINUE with the company growth, Sinclair Research has a new corporate structure. The re-organisation makes room for an enlarged board of directors and two divisions have been created to handle current and advanced products.

Clive Sinclair retains control as chairman and chief executive. He will supervise the advanced projects division, which at present is developing the flat-screen television.

Nigel Searle becomes managing director of the current products division. He will be responsible for marketing the personal computers already on the market, along with any peripherals launched and, of course, software. New products launched by Sinclair Research will be transferred to this division.

The board is to include four new members — Bill Matthew, finance director; Dave Hatten, production manager; Jim Westwood and David Southward, who have become research and development directors. Kenneth Dick, chairman of New Court Trust, has been appointed as a non-executive director.

Fires delay some deliveries

CUSTOMERS who have ordered items from the Jigsaw range of products manufactured by Phoenix Marketing have been experiencing delays in deliver. The two main reasons are that Phoenix had a fire at its premises and distribution was switched to another company, CAPS.

The agreement with CAPS has now ended because of problems with supplies from Phoenix. CAPS now says that since early February it has not been willing to accept any responsibility on behalf of Phoenix, which includes its previous arrangement of supplying refunds to people who had not received goods which had been ordered.

The software house Ground Control is experiencing delays in despatching orders. A spokesman for the company says that the stocks of products were available but because of staffing problems there is a backlog.

Harrison and Lockyer, a company which deals in hardware distribution, had a fire at its premises. As a result there are delivery problems.

The situation concerning the mail order firm Pretorius Systems is still being investigated. Customers of the company with a complaint who have not contacted *Sinclair User* are advised to write to the advertisement manager. Those customers who have contacted the magazine are advised that they will be updated on the situation in the near future.

Silversoft has had to move to a temporary address due to lack of space. It is now at 2 Hammersmith Broadway, London W6. The company does not see any difficulties concerning orders and all customers should receive their goods in the usual time.

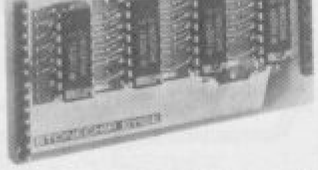
SPECTRUM AND ZX81 HARDWARE



PANDA

The famous Panda Expandable Ram Pack. Massive 16K add-on memory which can easily be expanded to 32K with an optional plug-in module. Supplied in rugged no-wobble design, rugged, injection moulded case, contoured to fit the ZX81 snuggly. Compatible with other add-ons (printer etc). LED on/off indicator. No additional power needed just plug in an go. British designed and made from top quality components throughout, guaranteed 12 months. **ONLY £24·50**

EXPANSION MODULE



The 16K 'Panda' is easily expanded from 16K to 32K by adding this expansion module as and when you need it.

ONLY £20·00

GIANT PANDA

Giant Panda the two together. Buy the Panda and the Expansion Module at the same time for a gigantic 32K bytes and save.
Complete at a special price of **ONLY £40·00**

PROFESSIONAL CASED KEYBOARD TYPE FD42



FOR ZX81 OR SPECTRUM

This famous, best selling product immediately converts your ZX Computer into a sturdy, attractive and professional unit, with full size typewriter keyboard. A tough plastic case encloses the keyboard, PCB and power supply. It has 42 keys including all the ZX81/Spectrum graphic characters printed on them. The full travel key switches have gold plated contacts and guaranteed life of 10^6 operations. It's so easy to install! You simply unscrew the ZX PCB from its case, screw it to the FD case, and plug in the keyboard. No soldering or technical knowledge required. **ONLY £29·00**

TYPE FDS FOR ZX81 OR SPECTRUM

Our new advanced keyboard has the same, fine specifications as the FD42 system, but with a new re-designed case, space bar and double-sized shift and enter keys. A must for the discerning ZX81 or Spectrum user. **ONLY £39·95**

ZX KLIK – KEYBOARD



If, like many ZX81 users, you are fed up with the dead feel of the touch sensitive keypad then consider the well tried 'Klik-Keyboard'. This is a simply fitted genuine push button keyboard which has been designed as an exact replacement for, and is no larger than, the existing keypad. ■ Fits on to the ZX81. ■ Full 40 keys plus one spare for any purpose. ■ No soldering – just plug in. ■ No trailing wires. ■ Clear permanent two colour legends. ■ Positive feel and sound as data is entered. ■ Speeds up programming enormously and reduces errors. ■ Fitting service offered £2·00 extra (remember to send your ZX81). **ONLY £24·50**

THE SOUND EXPANDER

A superb economical addition to your ZX Spectrum. Clear, dynamic sound effects will really enhance your enjoyment of the new exciting programs available for the Spectrum. Our new sound amplifier comes complete with leads, volume control and built-in loudspeaker. Simply plug into the mic input, it fits neatly on to the back of the Spectrum. **ONLY £7·50**

STOP PRESS

16K Spectrum owners – upgrade to 48K with a Spectrum Upgrade Pack complete with full instructions. No soldering. **ONLY £35·00**

COMING SOON!

Our range of products is constantly under development and review. We have selected products from leading manufacturers in the UK and believe these represent the best value and quality combination on the market today.

PRODUCTS ARE STOCKED AND USUALLY DESPATCHED WITHIN 10 DAYS.

I wish to order the following:

Quantity	Item	Amount
	Panda @ £24·50 inc.	
	Expansion Module @ £20·00 inc.	
	Giant Panda @ £40·00 inc.	
	FD 42 Keyboard ZX/Spectrum* @ £29·00 inc.	
	FDS Keyboard ZX/Spectrum* @ £39·95 inc.	
	ZX Klik-Keyboard @ £26·50 inc.	
	Sound Expander @ £7·50 inc.	
	Spectrum Upgrade Pack @ £35·00 inc.	
	TOTAL	

All prices include VAT and post and packaging. All items include a full year guarantee. Cheques/Postal Orders etc. should be made payable to: AFDEC Electronics Ltd.

Name ____________________

Address ____________________

Overseas customers add £4 post and packing

AFDEC ELECTRONICS LTD 318 Kempshott Lane Basingstoke Hants RG22 5LT

ZX81 GAMES

from

J.K. GREYE SOFTWARE LTD

PLEASE NOTE

As from March 31st the ZX81 games currently available from this company will be marketed solely by two separate companies as follows

---

Gamestape 1 — 10 games for 1k

Gamestape 2 — Starfighter, Artist Pyramid

Gamestape 3 — Catacombs

From:

J.K. GREYE ENTERPRISES
16 Park Street
Bath

Gamestape 4 — 3D Monster Maze

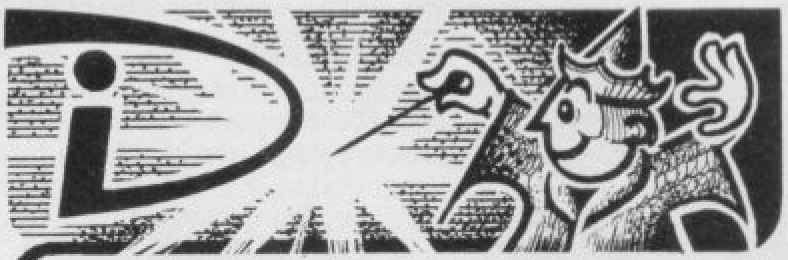
Gamestape 5 — 3D Defender

Gamestape 6 — Full Screen Breakout for 1k

From:

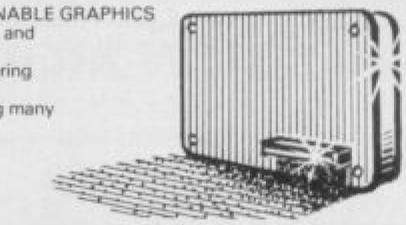
NEW GENERATION SOFTWARE
16 Brendon Close
Oldland Common
Bristol

Any enquiries concerning the above games should be made to the respective companies.

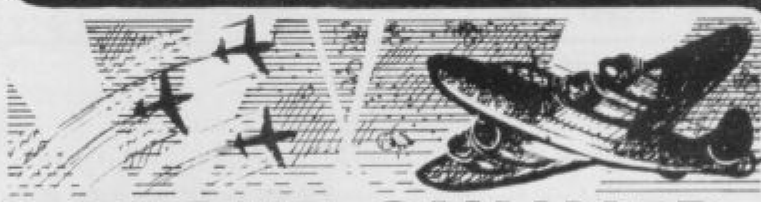


ZX81 HI-RES Graphics Pack!

* Fully programmable 256 by 192 pixel High Resolution display
* Powerful Hi-Res-BASIC Monitor in 2K EPROM includes PAGE, PRINT, PLOT (inc. LINE), SCROLL, INV, CLS, COPY
* Includes LOWER CASE CHARACTER SET for word processing
* Full dynamic control of USER DEFINABLE GRAPHICS
* Slim, stylish case fits between ZX81 and RAM pack
* No additional power supply or soldering necessary
* Complete with handbook containing many examples



PRICE £38.95 inc.
Please send SAE for data sheet
Please allow 28 days delivery.

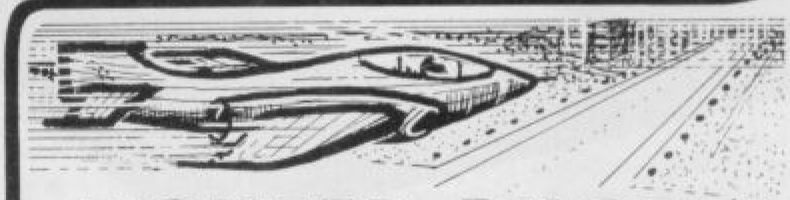


NIGHT GUNNER

Enemy aircraft approaching . . . BATTLESTATIONS!! Waves of enemy fighters swooping in for the attack? Can you survive another mission? This is the ULTIMATE challenge. An entertaining machine code game with excellent graphics. Requires 16K RAM pack only.

Highly addictive! **£4.95 inc.**

Now Available at major branches of WHSMITH



FIGHTER PILOT

15 feet . . . 7 feet . . . TOUCHDOWN! Instrument landings are not always as easy as this. You are in full control from take-off to landing during this real-time flight simulation of a jet fighter. Written by pilots — tested by pilots — for you to fly like a pilot.

'An excellent program!' Capt. H. Senior British Airways pilot.
Requires 16K RAM only **Super value at £4.45**

DIGITAL Integration

DIGITAL INTEGRATION
Dept. SU
22 Ash Church Road,
Ash, Aldershot
Hants GU12 6LX.

MAIL ORDER ONLY

TRADE ENQUIRIES WELCOME

All prices inclusive
(Overseas add £0.55 p&p per tape, £2.00 for HRG board)
All products guaranteed, refund if not satisfied.

Printer packages need adapting for Spectrum

AFTER A WAIT I received a ZX printer to add to my Spectrum. The manual with it told me that I must use the specially beefed-up power pack supplied. When I came to connect I found that it would not fit; the lead ends in a jack plug, whereas the Spectrum requires a hollow plug to fit over the pin in the socket. Also, since the manual gives programs only for the ZX-81 and there is no mention of the Spectrum, I concluded that I had been sent a package suited only for the ZX-81.

So I packed everything ready to return and telephoned Camberley. One of the best features of the Sinclair selling organisation is the pleasant and knowledgeable young woman on the end of the line there. She told me that I should use my existing Spectrum power pack — there is no mention of that anywhere else in the literature — and admitted that the manual was unsuitable. So although I have my printer, I have a dud manual and an unwanted second power pack, both suitable for the ZX-81, not the Spectrum, and for both of which I have paid.

The Sinclair organisation gives me the impression of being very fair to its customers in compensating for its failings. I suggest that the following action is now required:

A buy-back of the redundant ZX-81 power packs supplied to Spectrum owners who ordered ZX printers.

The supply of appropriate manuals to those people.

That future orders for ZX printers should specify whether they are for the Spectrum or the ZX-81. Spectrum orders would be fulfilled by the ZX printer and suitable manual only — no power pack — with an appropriate reduction in cost.

P G New,
Harpenden, Herts.

• *Sinclair Research says that it is considering the points made, adding that the printer is supplied as a complete product and it is not possible to split the package depending on the intended use. Removal of the power supply would have only minimal effect on price and at present would lead to confusion in the fulfilment of orders.*

Monster mistakes

I WOULD like to make three comments about the J K Greye Software 3D **Monster Maze** program.

The program instruction says that the maze exit is at the end of a cul-de-sac and that the generated maze is always formed in corridors.

I found the exit in a corridor once. As it was not at the proper place, it has twice raised from nowhere on my screen. I found a great open space in the maze. Information provided by the program was incorrect because in the reality Rex would be able to see me but the program said "Footsteps approaching" until the last two moves of T Rex — i.e., too late for me.

I regret that a £5 or £6 program in Britain is sold for nearly £14 in France. Is the Channel such a large sea to justify such a surcharge, even with tax surcharges? That fact must induce illegal copying and selling.

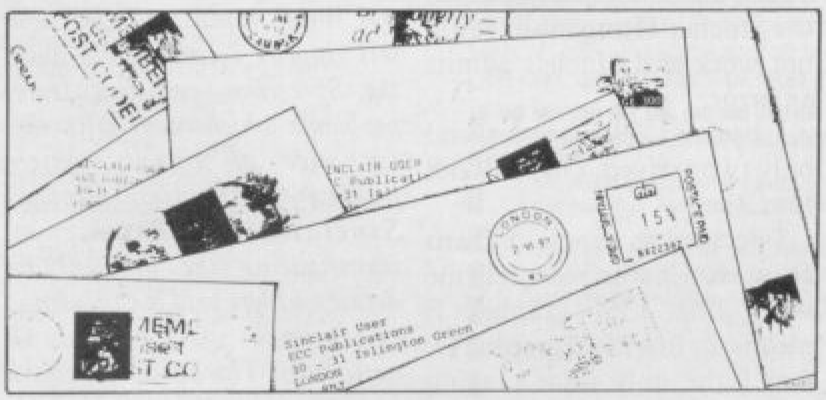
I would like to ask firms in the U.K. to include overseas packaging surcharges in their advertisements.

Finally, I am looking for a pen friend with whom I shall be able to swap ideas and programs. I am ready to make contact with anybody, wherever he may be in the world. He has just to own a ZX-81.

When will the Spectrum with a built-in SECAM colour system modulator be sold? From time to time the French computing press speaks about Sinclair pocket TV. Will it be ready soon in Britain? Will it soon be sold in France?

I have read your magazine since June, 1982 and it is super great.

Perceval de Montarby,
40 Ave des Tilleuls,
75016 Paris,
France.



Education sales higher

AS THE MAJOR distributor of Sinclair personal computer products to education and the sole distributor of equipment on the Department of Industry scheme, my company has been distributing SRL products for more than two years. The article, headed Spectrum school sales slow, may well cause some people to misunderstand the well-established sales procedure for education. I should like to take the opportunity to explain some details.

Griffin & George was appointed as educational distributor soon after the launch of the ZX-80. As we had been dealing with the supply of science equipment for education for many years, we could supply SRL products using our established

continued on page 20

Tips for postal selling

WITH REFERENCE to your reader's letter in the February issue, I would like to make the following points about my company:

All orders are despatched within 24 hours or less from the time of receipt.

We can do that only because of our policy of not advertising or taking orders for products which are not available from stock.

That sometimes means upsetting advertisement managers of various magazines who like to book space at least three months in advance.

A product must be shown to be fully working before taking orders, i.e., not a prototype or mock-up.

Enquiries take time; as the customer has not paid for time spent orders come first. Second, customers not sending SAEs will go to the bottom of the pile.

The best thing is to telephone and ask whether the product is ready if you send your money today. Send a SAE with any enquiry and with a legible address and, if possible, a telephone number, as it is often cheaper to telephone than post a letter.

Stephen Adams,
London, N16.

continued from page 19

invoicing-after-delivery procedure. That has remained the case for the ZX-81 and the Spectrum.

As educational distributor, Griffin & George provides a range of hardware accessories and software specifically to support the product in education. We also have a large technical and sales staff to run exhibitions and training workshops. It is obviously cheaper for teachers to benefit from that rather than having to provide the resource within individual local education activities.

Unlike either of the other machines in the DoI scheme, our customers or the local education authority do not need stocks of expensive spare parts and to have skilled, expensive technicians to fit them. Griffin & George administrates any repair procedure, normally manifested as a rapid one-for-one exchange.

As to the rate of sales to schools, they are exceptionally high and not, as your headline may suggest, slow.

R M Lovett, Microelectronics manager, Griffin & George, Birmingham.

Scrolling made easier

A FEATURE lacking on the Spectrum is the SCROLL command. Although substitutions have been published for it, involving POKEing and PRINTing, I believe my solution is much neater. Simply by calling the USR routine, USR 3280, a scroll of one line is performed with no fuss.

I hope this will be of some use to your readers and I congratulate a magazine which improves with age rather than being thinner with time.

Peter Bernstein, Northwood, Middlesex.

Code junkies are usually male

J E M FRADGLEY — letters, February 1983 — should not worry about her daughter. My articles on Code Junkies — December 1982 — took a male stance simply because our female students appear to be immune from the addiction. Why is not clear and a straw poll in our department produced suggestions that girls complete adolescence earlier, are under less parental pressure, lead a more active social life at university, or simply show a higher innate level of common sense.

Our own experience shows that our female students are far more likely to get good degrees in computer science.

C F Reynolds, Reader in computer science, Brunel University, Uxbridge.

Beginner's queries

I PURCHASED a 48K Spectrum and programmed the Sinclair **Hangman.** It did not work and Sinclair admits an error.

I ordered 10 cassettes and only two arrived. One will not load.

I decided to program **Dam Buster.** Can anyone tell me what line 135, graphic E means, or line 2000 graphic D. Am I the only idiot playing with a Spectrum?

G Abrahams, Birchington, Kent.

• *You appear to have been more unfortunate than most with your new machine. To help your understanding of our listing system; because the reproductions of the graphics characters can be confusing, we have tried to make it easier to enter them by denoting which key should be pressed.*

Instead of printing a black blob we indicate that it is an inverse space. Your query involves the user-defined graphics which are entered by going into graphics mode and pressing, in line 135, the E key. When the program is run it will appear as the character which has been defined in another part of the program.

Television problem

I BOUGHT a Spectrum and am experiencing some difficulty tuning it in to my TV set. Often to get a respectable picture it has to be tuned so that the display is in black and white. If tuned to be in colour, the lettering is very wavy and not at all clear. I have tried it on other sets and it would appear to be satisfactory.

I am told that it may be incompatible with the TV set. Can that be so and what can be done about it?

The set is a Hitachi CAP-162 colour portable.

G P Glover, Bradford.

•*A small number of television sets appear incompatible with the Spectrum, resulting from problems which occur with the exchange of signals which produce the television display. Sinclair Research is investigating the problem in detail and has said it can advise customers or potential customers. The Spectrum could be re-tuned but that would make it incompatible with other television sets.*

Finding a better beep

AS A SINCLAIR addict I have bought every copy of your magazine since issue one in April, 1982 and would like to congratulate you on an excellent publication.

My ZX-81 has since passed on and I now have a 16K Spectrum — not without the usual difficulties, I might add. I would like to raise two points which may be of interest to 16K Spectrum users:

The first entry I always make at the start of a programming session is POKE 23609,100. The difference it makes to the keyboard beep is amazing and I cannot imagine why it was not built into the ROM.

I was tempted to enter **Pontoon** published in your January, 1983 edition, despite the fact that it was written for 48K. I was able to do this by omitting the playing instructions in lines 220-290 inclusive and the excellent program now runs faultlessly on my 16K.

Colin Kostyrka, Maidstone, Kent.

Program improved

WITH REFERENCE to John Gilbert's continuous series on good programming, may I make a suggestion? If a safeguard against an invalid numeric input is incorporated in line 1050, or after, together with any desired message to the user, it is then possible to replace lines 300 to 700 with the single statement:

GOSUB 1000 ÷ (VAL A$*1000)

That is surely nearer to good programming than a series of time- and memory-consuming, unnecessary IF . . . THEN statements. What would he have done with, say, 30 subroutines? The mind boggles.

M Gordon, Southgate, N14.

Corrected prices

THANK YOU for your excellent review of our arcade game **Scramble.** We would like to point out that the correct price is £5.50 plus 40p p&p. Also we would like to point out that the correct price for **Sorcerer's Castle** is £5.50 and not £6.50 as printed in the club offer.

M Meek, Mikrogen, Bracknell, Berkshire.

GET THE BEST NEW PROGRAMS AND THE ALL-TIME GREATS, SPECTRUM OR ZX81

AT SOFTWARE SUPERMARKET NOW

We started Software Supermarket with just one idea. To play all the Spectrum and ZX81 games we could find, to select the very best, and to offer only those to our customers.

Judging by our mail from all over the world, you're very pleased with our free selection service. It's impartial (we produce no programs ourselves) and it saves you £££'s on stamps and mistakes.

And it's fast. We usually despatch your order within 48 hours. Here's the best of the new and the best of them all for your Spectrum. Plus some great ZX81 games. Full detailed catalogue sent free with every order. Or send large SAE for catalogue only.

ZX SPECTRUM: 16/48K

Our latest Top 10 Programs for your Spectrum. They run on both 16 & 48K.

3D TUNNEL Brilliant NEW 3D graphic game by Malcolm "Escape" Evans. Fly down the winding 3D tunnel shooting bats, spiders, frogs and rats! Demo mode: 3 speeds: training program for each phase. And (48K only) watch out for the Tube train! (New Generation) £5.95

3D TANX NEW game with stunning graphics. Shoot the enemy from your 3D tank turret. 3 play levels: accurate ballistics: 1 or 2 players: hold feature: demo mode: training program. And choose your own control keys: even plays 'God Save The Queen'! (DK'Tronics) £4.95

WINGED AVENGER *"One of the best...covers all the stages of the arcade original...a game to come back to." Pop:Comp:Wkly.* Very fast 'PHOENIX'. 7 play levels: 3 attack waves: laser shield: mothership with smart bombs. (Work force) £4.50 (16K ZX81 version, £4.50)

GROUND ATTACK *"Best Spectrum version of the arcade game" Yr:Comp: "Very absorbing" E&C: "Extremely good" Pop:Comp:Wkly.* Thrilling 'SCRAMBLE'. Pilot your ship thro' 26 zones: up, down, brake, thrust: smart bombs: as you get better, it gets harder. (Silversoft) £5.95

CENTIPEDE The first - and fast - Spectrum version of the famous arcade game. Full arcade movement - left, right, up, down, fire - as you attack the centipede. Great graphics. Watch out for the jumping spider! 3 lives: hold feature. (DK'Tronics) £4.95

ESCAPE *"One of the best and most original games we have seen" S.User.* 5 very real dinosaurs chase you round the maze as you search for the axe to escape. Different maze every time. 5 play levels: 9 speeds: Hall of Fame. (New Generation) £4.95

GULPMAN *"The one cassette that I would buy...an exceptional program." Pop:Comp:Wkly* 15 mazes, each with demo mode: 9 speeds: laser gun helps against 4 chasers. Program your own control keys: personalise/save your very own game. (Campbell) £5.95

COSMOS NEW! Fantastic graphics. Loads in 2 parts (instruction manual first). Protect your 9 ships against 18 aliens, warp mines, asteroids. Your graphic on-board computer helps with elaborate displays. Our favourite new game. (Abbex) £5.95

FAUST'S FOLLY The first adventure we've seen that's worth playing in 16K. It's great and it's got graphics! Loads in two parts: clear instructions first. Then a smashing adventure with directions, inventory, look, score, save. Amazing! Abbex) £5.95

OTHELLO *"Recommended without reserve...a superb opponent" Yr:Comp.* The great 19th Century power game. Surround your opponent: capture his territory. Millions of different games: maximum 60 moves each. 1 or 2 players: demo game: 9 skill levels: print. (Mol) £7.95

ZX81 OWNERS!

Special 16K ZX81 versions of 6 of these programs are available:

WINGED AVENGER	**£4.50**	**PIMANIA**	**£8.00**
OTHELLO	**£6.95**	**CHESS 2**	**£9.95**
BLACK CRYSTAL	**£7.50**	**GREAT BRITAIN LTD**	**£4.95**

Use the coupon to order. Free detailed catalogue of our best ZX81 games with every order. Or send large SAE for catalogue only.

48K SPECTRUM ONLY

These programs use nearly all the Spectrum's 48K. They will not run on the 16K Spectrum. But there are versions of Black Crystal, GB Ltd, Pimania and SpecChess for for 16K ZX81.

PIMANIA *"The best adventure game we have reviewed" S.User. "An adventure enthusiast's dream" C&V Games.* Best use of Spectrum graphics and music we've seen. A wonderfully witty adventure - and you could win the £6,000 Golden Sundial of Pi. (Automata) £10. (ZX81 16K version: £8)

TIMEGATE *"The best graphical game I have seen on any micro" Interface. "Excellent graphics...one of the best" Yr:Comp: "Fast and furious...required playing for any Spectrum owner" Which Micro?* 5 skill levels: training program: Hold: Hall of Fame: keyboard overlay: 26-page on-screen manual. (Quicksilva) £6.95

THE HOBBIT *"Superior to any other adventure game available for the Spectrum" Yr:Comp:* Free 285-page illustrated book of The Hobbit contains clues to help solve the adventure. 30 beautiful full-screen pictures: 500 word vocabulary: 16 page instruction manual: save: print: pause. It took 4 people 18 months to write! (Melbourne House) £14.95

GREAT BRITAIN LTD *"A colourful and sophisticated management game" Pers:Comp:wld: "Difficult and challenging" ZX Comp:* Even plays 'Rule Britannia'! Choose your party and run the country. Will inflation and unemployment come down or the rioters come out? It's up to you. Then watch the results on election night! (Hessell) £5.95 (16K ZX81 version, £4.95)

SPECCHESS *"The standard for ZXChess" ZX Comp: "The strongest chess program" Pop:Comp:Wkly.* Full graphic chessmen: 7 play levels: all legal moves: position analysis for problem-solving: recommended move option: print game history. (Artic) £9.45 (ZX81 non-graphic 16K version £9.95)

BLACK CRYSTAL Take the adventure of your life. 180K of program to unravel, on two thrilling cassettes! You must solve each of the 6 stages to defeat the Lords of Chaos. Real-time monster battles: 16 command keys. (Carnell) £7.50 (16K ZX81 version: Over 100K loads in 7 parts. £7.50)

Post to: SOFTWARE SUPERMARKET, 87 Howard's Lane, London, SW15 6NU.

If you do not want to cut this magazine, write your order out carefully on plain paper and quote this number: **SU5** Mail Order Only.

I own a 16K Spectrum ☐ 48K Spectrum ☐ 16K ZX81 ☐ (please tick)

I enclose my Cheque/PO for £.................. payable to Software Supermarket.

Please use block capitals. If we can't read it, you won't get it.

Name ....

Address ....

....

..................Postcode ....

Phone, if any, in case we have any query ....

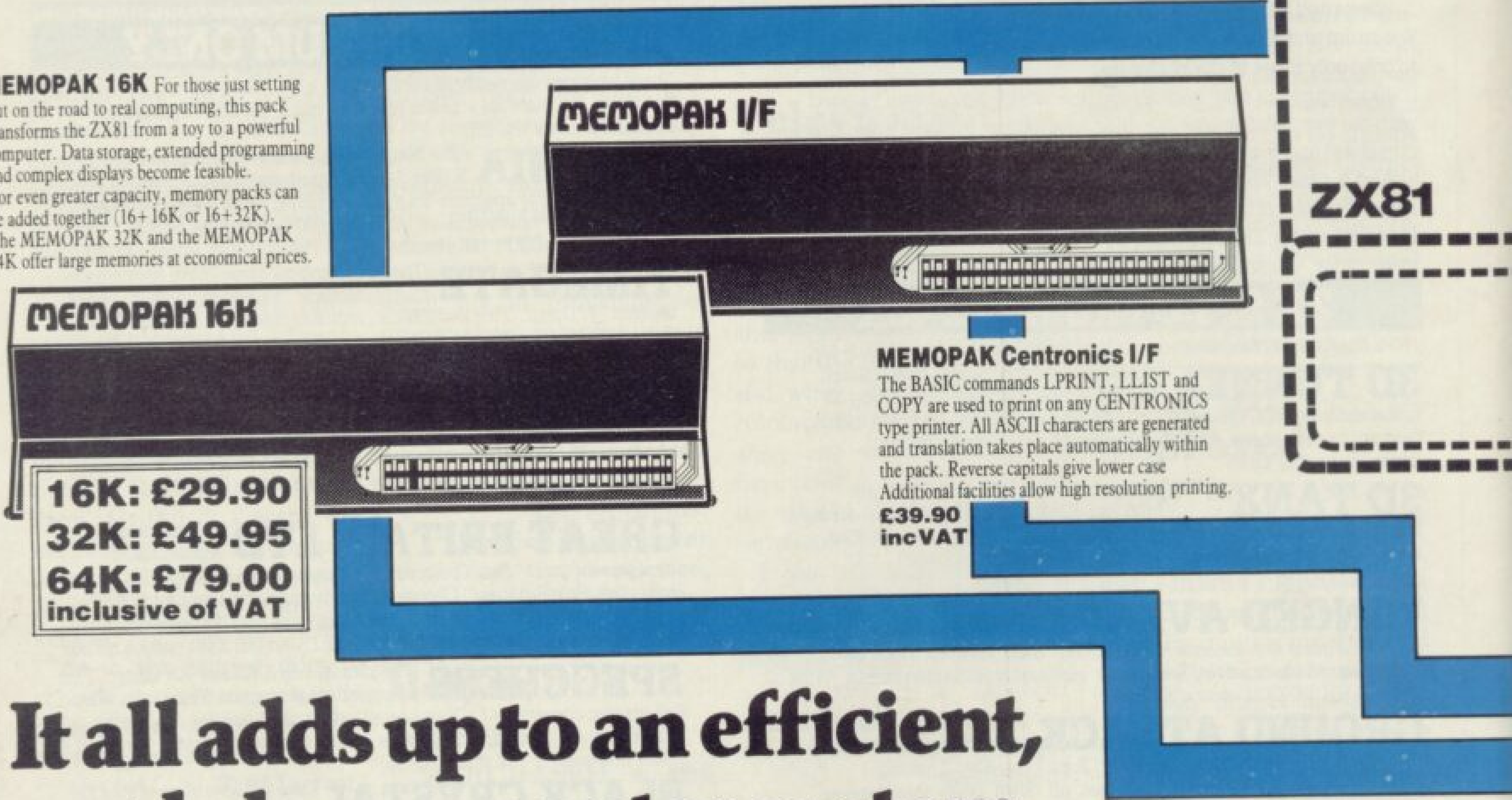
Program Name	Computer	Price

POSTAGE AND PACKING	U.K. Add 55p only per order	£
	EUROPE. Add 55p for each program	£
	OUTSIDE EUROPE. Add £1 for each - program airmail	£
	TOTAL	£

SOFTWARE SUPERMARKET

87 Howard's Lane, London SW15 6NU. 01-789 8546

At Mem
we realise the poten



MEMOPAK 16K For those just setting out on the road to real computing, this pack transforms the ZX81 from a toy to a powerful computer. Data storage, extended programming and complex displays become feasible.
For even greater capacity, memory packs can be added together (16+ 16K or 16+32K).
The MEMOPAK 32K and the MEMOPAK 64K offer large memories at economical prices.

16K: £29.90
32K: £49.95
64K: £79.00
inclusive of VAT

MEMOPAK Centronics I/F
The BASIC commands LPRINT, LLIST and COPY are used to print on any CENTRONICS type printer. All ASCII characters are generated and translation takes place automatically within the pack. Reverse capitals give lower case
Additional facilities allow high resolution printing.
£39.90 incVAT

It all adds up to an efficient, modular computer system

The **Memotech** approach to microcomputing is to take the well-proven and popular ZX81 as the heart of a modular system. This small computer houses the powerful Z80A processing unit and acts as the central processor module through which the **Memopaks** operate.

Memotech has a reputation for professional quality, producing units which are designed to fit perfectly, to look well-balanced, and to work efficiently and reliably.

The modular approach gives ZX81 owners the freedom to design the system they really need. Furthermore, the intercompatibility of the modules ensures that later additions will click straight in, to give you a system that grows with your ambitions and abilities.

To ensure that your expectations are realised, care is taken at every stage to design features into the system to anticipate your needs. For example:
1) Memories are cumulative e.g. 16K and 32K can be added to the **Memopak 16K** or even to the Sinclair 16K RAM pack. 2) The **HRG** firmware allows commonly used constructions (such as scrolling, shading and labelling graphs), to be called by a few simple commands. 3) The **Centronics I/F** converts ZX81 character codes into ASCII and extends the print line to the width of the printer, still using the LLIST, LPRINT and COPY commands.

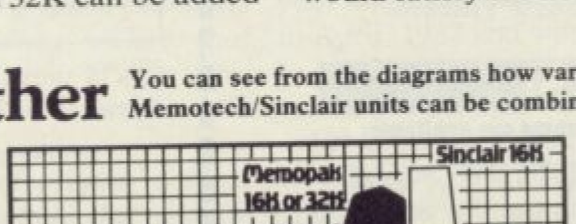
As one example, a system with 16K of memory and **Memocalc** is all that is required to perform the same sophisticated numerical projections as a computer at 10 times the price. The problem may be as complicated as a cash flow or production schedule, or as simple as household accounts or pocket money budgeting. If your bank manager wants to see a cash flow, then a single print instruction to the **Centronics I/F** will give a printout which is more than acceptable.

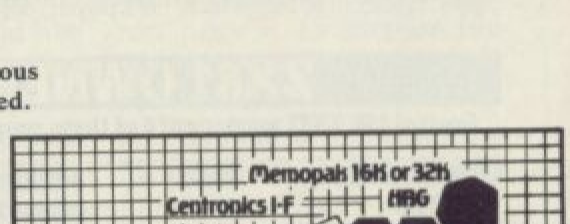
The example system which is shown, on the other hand, would satisfy the needs of someone who wanted to enter data

How it all fits together

You can see from the diagrams how various Memotech/Sinclair units can be combined.

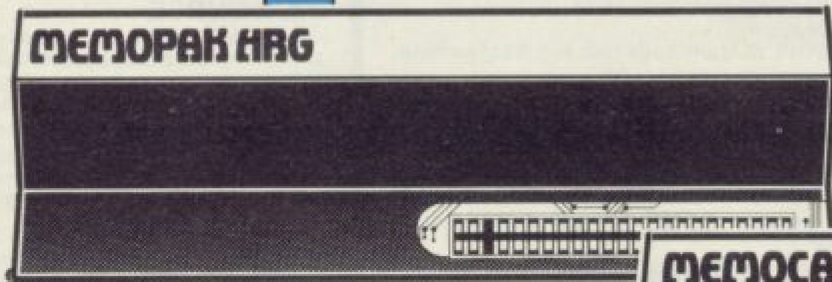


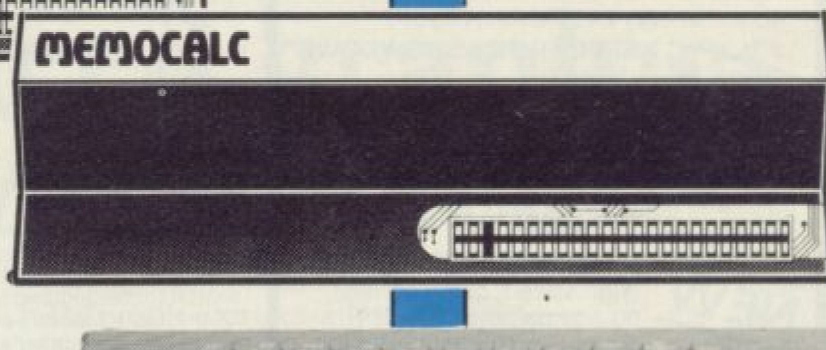




otech,
tial of your ZX81...

MEMOCALC The screen display behaves as a 'window' on a large sheet of paper on which a table of numbers is laid out. The maximum size of the table is determined by the memory capacity, and with a MEMOPAK 64K a table of up to 7000 numbers with up to 250 rows or 99 columns can be specified. Each location in the table can be either a number which is keyed in or a formula which generates a number.
£29.90 inc VAT



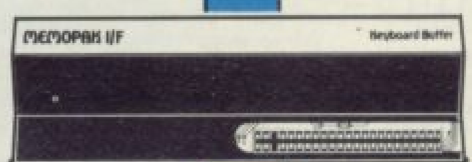


MEMOPAK HRG This pack breaks down the constraints imposed by operating at the ZX81 character level and allows high definition displays to be generated. All 248 × 192 individual pixels can be controlled using simple commands, and the built in software enables the user to work interactively at the dot, line, character, block and page levels. Scrolling, flashing and animation are all here.
£39.90 incVAT



MEMOTECH KEYBOARD
The Memotech plug-in Keyboard plus buffer pack takes the effort out of data entry for ZX81 users. The Keyboard has a light professional touch and is housed in an elegant aluminium case. The simple plug-in system means that you are not obliged to open up your ZX81, use a soldering iron or invalidate your ZX81 warranty.
£49.95 inc VAT





KEYBOARD BUFFER PAK
The Buffer Pak performs a "housekeeping" function for the Keyboard, interfacing directly with the port at the back of your ZX81.

via a light-touch keyboard, construct and label graphs, and then copy the screen to an 80-column printer. Only 16K of memory is shown here but with additional memory, more than one video page can be stored. Up to 7 pages can be displayed in rapid succession to give animated displays.

Looking forward, **Memotech** will continue to back the ZX81 through 1983 with fast storage devices, pressure sensitive electronic drawing boards and more software packs including a **Wordprocessor,** an **RS232 Interface** and a **Z80 Assembler.**

Memotech products are available from major branches of **W.H. Smith & John Menzies**

To: Memotech Limited, Witney, Oxon, OX8 6BX
Tel: Witney 2977, Telex 83372 Memtec G
Please send me the following Memotech products:

Please add £2.00 per item to cover post and packing

I enclose a cheque/P.O. for ________
or please debit my Access/Barclaycard account number

Signature ______________________ Date ______

Name and Address ______________________

Push your Sinclair to the limit

ZX81/SPECTRUM ARCADE GAMES

NEW **ZX INVASION FORCE** (ZX81)
Use your skill to fire through the energy band to destroy the menacing alien ship — **£3.95**

NEW **SPEC INVADERS**
SPEC GOBBLEMAN
These exciting high-speed classic games incorporate hi-resolutiongraphics and sound to bring you the best in arcade action at only **£4.95** each (16/48K)

NEW **SPEC FROG 5/SHOWDOWN** (16/48K)
Hop across the dangerous road avoiding the lethal cars, then lorries. Go back to the wild west for a gunfight battle amongst cacti and wagons. Features include western music. **£4.95**

NEW **NAMTIR RAIDERS** (ZX81)
High speed, quick action arcade game with four separate groups of attackers. **£3.95**

Gobbleman also available for ZX81 at **£3.95**

UTILITIES

NEW **TOOLKIT**
Nine powerful new functions for your ZX81 (including re-number lines (goto, gosub), program merge, string finding and replacement. **£5.95**

SPEC BUG
A 30 in 1 machine code tool and disassembler for your ZX Spectrum. **£6.95**

ZX BUG
A 30 in 1 machine code tool and disassembler for your ZX81. **£6.95**

Improve your machine code programs with this new 48K Spectrum Assembler

Just released by Artic, this new professional quality assembler is also available for 16K ZX81 and features:—

* Word-processor-like text editor. * High-speed, versatile two-pass mnemonic assembler with labels and detailed error-trapping. Will assemble to any address. * Essential support facilities such as memory-edit, register inspect/modify and search for de-bugging. * Full output to ZX-printer. * Memory-status report and comprehensive user-manual.

ONLY **£9.95**

ZX81 & SPECTRUM

NEW LOW PRICE ADVENTURE GAMES

ONLY £5.95 for ZX81 and £6.95 for SPECTRUM

INCA CURSE (Adventure B)
In a jungle clearing you come across an ancient Inca temple. Your mission to enter, collect the treasure and escape alive. But beware! Includes a cassette save routine.

SHIP OF DOOM (Adventure C)
You are unavoidably drawn to an alien cruiser. Can you reach the control room and free yourself? Or will they get you first? Includes a cassette save routine.

ESPIONAGE ISLAND (Adventure D)
While on a reconnaisance mission your plane loses control and you are forced to land. Can you survive and escape with the island's hidden secret?

PLANET OF DEATH (Adventure A) 16/48K
You find yourself stranded on an inhabited alien planet. Can you reach your ship and escape?

also available for SPECTRUM

ZX FORTH
Supplied on cassette with editor cassette, user manuals and keyboard overlay. ZX Forth combines the simplicity of basic with the speed of machine code now **£14.95**

THE ULTIMATE ADVENTURE FOR THE SPECTRUM/ZX81 for only £9.95

AND THE CHANCE TO WIN £10,000 or more IF YOU KRAKIT™



RULES AVAILABLE FROM ARTIC

Your eccentric father has left you £10,000 in his will. In order to claim your windfall you must solve twelve clues and gain access to a bank account in which the money has actually been deposited. Be the first to crack the puzzle and the prize is yours! Plus you will win two tickets to the city of the secret KRAKIT™ vault location. The Prize money is increased weekly. A telephone number will be supplied so you have the opportunity to find out just how much you could win.

DON'T MISS YOUR CHANCE TO WIN A FORTUNE!

SPECTRUM MICRO CHESS

The only Chess program for a 16K or 48K Spectrum. Allows all legal moves, castelling; en-passant and pawn promotion. Options to play black/or white. Sets board in any position. Full colour and graphics display.

ONLY **£6.95**

new releases for 16K & 48K SPECTRUM

SPECTRUM INVASION FORCE

A popular arcade game for 16K or 48K Spectrum. Fires through the force field to destroy the menacing alien ship. Sounds easy?? Two levels of play — normal or suicidal. Full colour. Sound and hi-res. graphics.

NOW ONLY **£4.95**

A GREAT CHESS GAME FOR YOUR ZX81 OR SPECTRUM*



*SPECTRUM CHESS 48K

ZX CHESS I
Very popular machine code program, with six levels of play and an analysis option. Available for ZX81. **£6.50**

ZX CHESS II
A new improved version, with a faster response time, seven levels of play, analysis option and in addition a recommended move option. **£9.95**

ZX 1K CHESS
An incredible game in 1K for only **£2.95**
As featured on ITV

NEW **SPECTRUM VOICE CHESS**
This incredible program talks you through your game. It tells you its move, recommends a move, and contains a range of facetious comments. The game is based on the highly successful ZX Chess II and is offered at the Christmas offer price of **£9.95**.

SPECTRUM CHESS now only **£9.45**

ALWAYS AHEAD WITH ZX81/SPECTRUM SOFTWARE

Cheques & P.O. made payable to: Artic Computing Limited. Dealer enquiries welcome.
Please state whether your order is for ZX81 or Spectrum. Send S.A.E. (6in × 9in) for catalogue.

ARTIC COMPUTING LTD.
396 JAMES RECKITT AVENUE, HULL, N. HUMBERSIDE.

To: Artic Computing Ltd., 396 James Reckitt Avenue, Hull, N. Humberside, HU8 0JA.

Please supply..

Cheque for total amount enclosed.

Name..

Address..

SU 3

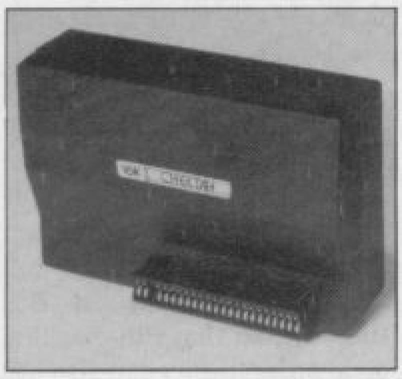
Non-wobble RAM pack

CHEETAH MARKETING has produced a 16K RAM pack for the ZX-81 which stops any RAM pack wobble without using glue, tape or screws. The front has been contoured to fit the curved back of the ZX-81 and fits it like a glove.

Vigorous tests were carried out, such as thumping the keyboard heavily, but it refused to crash. The cost is £19.75 inc.-VAT and postage.

Cheetah also makes a 64K RAM pack for £44.75. Printer owners may be pleased to know that it also works well with the Sinclair printer.

Cheetah Marketing is at 359 Strand, London WC2. Tel: 01-240 7939.





Advanced graphics from Memotech

MEMOTECH has been producing RAM packs for some time but also produces a keyboard for the ZX-81 and a hi-res pack. The keyboard does not require the user to dive into the machine to fit. Its interface module goes into the back of the ZX-81 like all the other modules and the keyboard is on a 7in. cable emerging from the end of the metal box. It provides only 40 keys — no space bar — and the keys tend to echo inside the box, but it works well. It would be very useful to the non-technical user and does not invalidate the guarantee.

The hi-res pack — HRG — requires the use of at least a 16K RAM pack in which to store its high-res pages. Depending on the size of memory, more than one 6,337-byte page can be stored. The pages must be stored outside the normal memory above RAMTOP.

The routines to control the screen are in a 2K EPROM from 8K-10K and use certain reserved Basic variables to transfer information to the routines. Twelve variables are required to be set up to make full use of the system; one of the Z$ is used to contain one of 30 commands.

The screen must first be set up by allocating variable V to the start of the video page, Z$ to "STARCH" and calling the user routine via RAND USR 8912. That then sets up the screen, clears it and changes the screen from the Sinclair version.

You can then see only the hi-res screen, no INPUTs or commands are visible, and PRINT, PLOT and the like will appear on the Sinclair screen. To return to the Sinclair screen you must either press the black button on the side of the hi-res unit or set Z$ to "Basic" and call the user routine again.

All commands are given in

continued on page 26

ZON X for Spectrum

BI-PAK has now made the ZON X-81 sound box available for the Spectrum as well as the ZX-81. It contains an 8912 three-channel sound chip with a powerful amplifier, loudspeaker and volume control in a 6in. × 3in. × 2in. black box. Everything is powered from the computer and some complicated sounds can be generated which will repeat without the aid of the computer.



As the device is I/O-mapped it requires machine code on the ZX-81 but an ingenious method of making it compatible with other REM-located machine code makes it easy. The Spectrum must use an additional board which contains a 3.5MHz oscillator to stabilise the frequency used. That is about 2in. long and fits between the Spectrum and the ZON 81.

One problem with the decoding makes it incompatible with the Microdrive and RS232 intended for the Spectrum as it uses A4, which Sinclair has already declared will be used by its devices. Apart from that it works well on both machines, providing a cheap and easy alternative to the BEEP command.

Bi-Pack sells the ZON X for £25.95 and the Spectrum board for £6.80. Bi-Pak is at PO Box 6, 63a High Street, Ware, Herts. Tel: 0920 3182.

continued from page 25

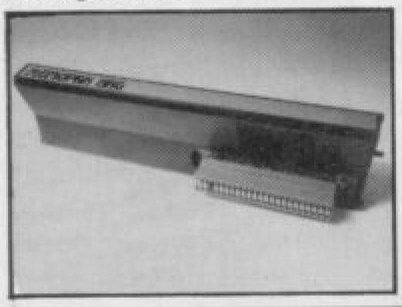
that way through the same USR call. X and Y variables determine the plot position, X being in the range 0-247 and Y is 0-191. Lines can be drawn from point P/Q to X/Y using "LINE";"UNLINE" unplots them.

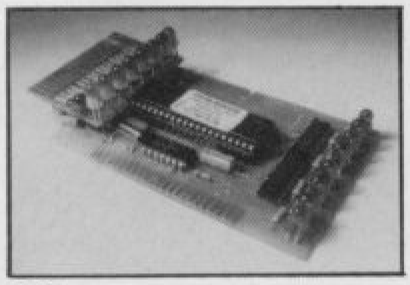
It is a useful device but one which is not easy to learn to use. Many variables have to be set and re-set during the program for it to work. Error codes are given but things like the scroll commands can crash the system if they are not used properly.

The casing is stylish and strong and Memotech includes Velcro strips to stick the packs to the ZX-81 to stabilise them. All the Memotech packs are moulded to fit the back of the ZX-81 and each other.

The Memotech keyboard costs £49.95 and the HRG pack £39.90. They can be purchased from Memotech Ltd, Witney, Oxon OX8 6BX. Tel: 0993 2977, or from larger W H Smith branches.

Memopak HRG





32-way port for Sinclairs

EPROM SERVICES produces a 32-way port for the ZX-81 or Spectrum which has LEDs to indicate the state of its outputs. The device is based on an 8255 chip which is I/O-mapped to give 24 lines. One of the outputs is then fed to a set of eight flip-flops which produce the other eight lines.

A flip-flop gives two outputs which are always the opposite of each other, so if one is 0 the other is 1. That allows you to drive more devices but does not give more than 24 controllable two-state lines.

One of the facilities provided is for using the port to select other devices.

The PCB has no edge connector, so it has to be used with a motherboard or back-to-back connector.

Eprom Services is at 3 Wedgewood Drive, Roundhay, Leeds LS8 1EF. It charges £15 for the port and £24 for a motherboard for the Spectrum.

New company goes hi-res

A HIGH-RESOLUTION graphics pack designed to work on a ZX-81 with at least 8K of memory is the G007 produced by the Nottingdale Technology Centre. By extending certain commands in Basic such as SLOW, FAST, CLS and PLOT it gives the ZX-81 a 256 × 192 dot screen — it is slightly bigger but to keep the calculations simple it is limited to that.

The extra number at the front of the commands gives access to the extra commands, i.e., CLS 3 inverts the whole screen without clearing it. The routines available allow the plotting of individual pixels on the screen, drawing lines, triangles and parts of circles, as well as shading them.

PRINTing may be done to any pixel on the screen as the PRINTing corresponds to the graphics pointer. That enables you to print a character, number or letter at any place on the hi-res screen. The SLOW command determines whether it is printed in black or white and what the background will be.

The use of the hi-res screen is enhanced further by the fact that the edit line is constantly on the screen, so INPUT and commands can be given without having to switch backwards and forwards between screens. Both the Sinclair screen and the hi-res version are separate and so clearing one will not effect the other.

Both screens can be SAVEd, LOADed and COPYed from Basic. The hi-res screen is stored as the last program line — line G007 — and can be deleted only by a USR routine. The Sinclair Basic will not allow you to SAVE it as a named program, however, so LOAD"" must be used to get it back.

The program is stored in a 2K (2716) EPROM inside the unit and uses the internal memory of the ZX-81 — 1K or 2K — to store its system variables. All of those are described in the manual with the unit, so that the machine code programmer can also use them. There are three example programs, only one of which failed to work.

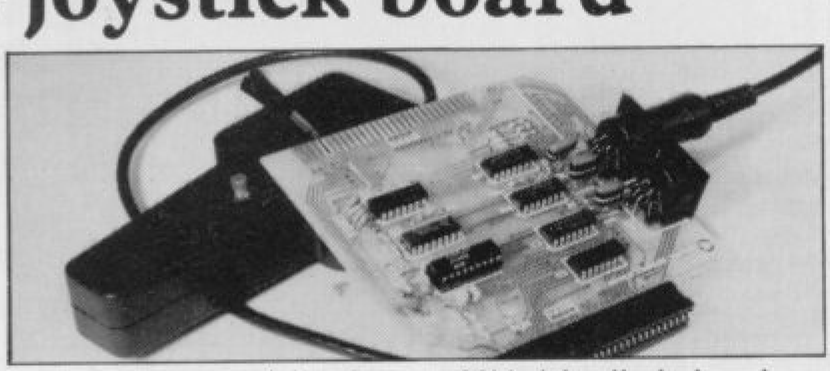
The device goes directly on to the back of the ZX-81, as it has to decode the internal memory into using the 8K-12K section of memory on the ZX-81. That means it could be incompatable with some ZX-81 RAM packs or add-ons. Using it is very easy, as one soon becomes used to adding the extra numbers — they are all fully syntax-checked too — and the display is rock steady.

Perhaps the next project for the group will be a colour board, as it would make it a very cheap BBC machine, but using only 6K of memory for the screen. To order the device, send £37.55 to Nottingdale Technology Centre Ltd, TFL (ZX-81), 189 Freston Road, London W10 6th. Tel: 01-969 8942.

Analogue joystick board

MIDWICH has produced an analogue joystick board which fits both the ZX-81 and the Spectrum. It can take two joysticks by plugging them into two six-way DIN sockets on the side of the bare board. It is input/output-mapped and requires the use of a small section of machine code on the ZX-81.

The board uses a ZN499E A/D converter and a switch to select which direction to measure. The results vary from 0 to 255 for each direction on the joystick —N/S and E/W — and the "FIRE" button operates one bit each of a



second port, one giving 0 or 128 and the other 0 or 64; the higher number indicates that the button is pressed. Both pressed gives 128 = 64 (191).

Inserting the power plug is difficult, as not sufficient space has been left between that and the joystick sockets on the Spectrum version.

Midwich sells the board as a kit for £17.20 and assembled for £22.95. The joysticks cost £4.50 uncased with fire button. The kits are well-designed with good instructions. Midwich Computer Co Ltd, Rickinghall House, Richinghall, Suffolk 1P22 1HH. Tel: 0379-898571.

VOLCANIC DUNGEON CHAMPIONSHIP

CARNELL SOFTWARE



WIN A FABULOUS wings HOLIDAY FOR 2 TO FLORIDA.

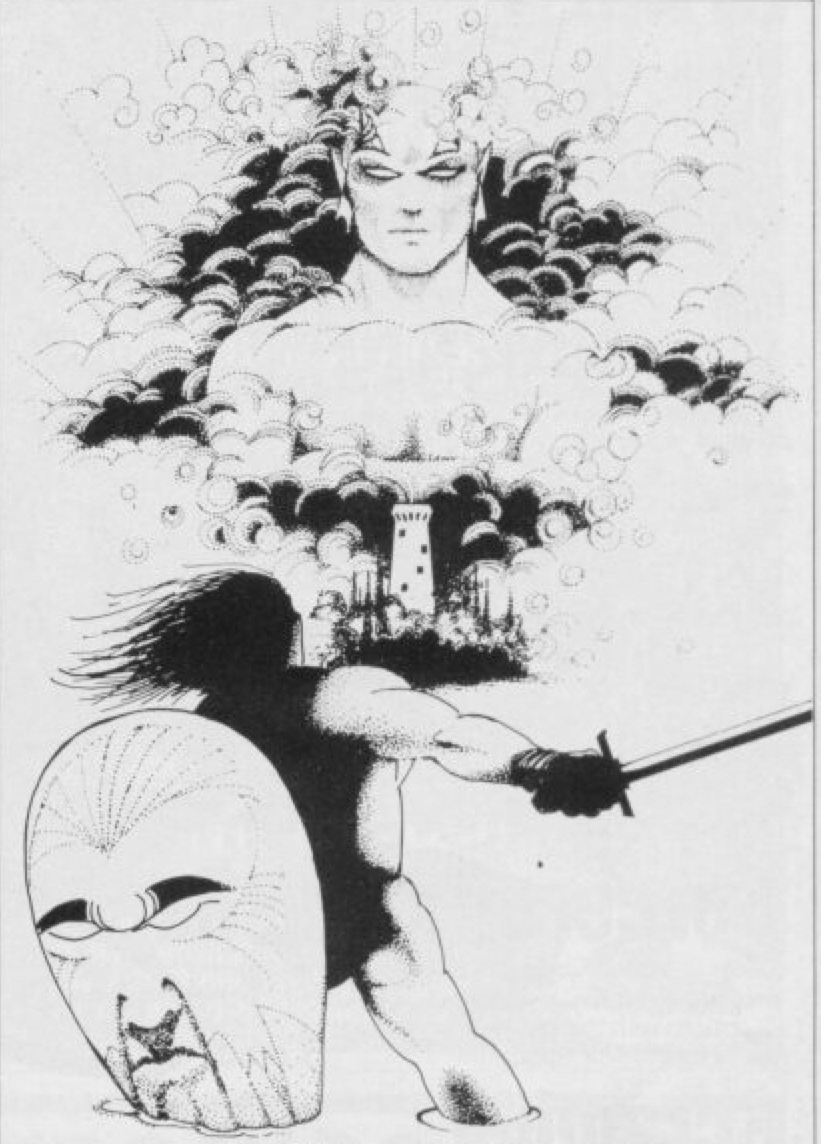
VISIT THE AMAZING NEW EPCOT CENTRE

Volcanic Dungeon, the addictive adventure. People have been known to venture into its maze of caverns to rescue the Princess Edora again and again. If you are one of them, or wish to be, then you could find yourself lying on a **sun-drenched beach in Miami for a week. Followed by a further week at Orlando,** visiting **Disney World** and **Epcot**. So what do you have to do for all this? **Just be the best Volcanic Dungeon player in the UK, that's all!** Ten finalists will battle it out in the championship at the London Computer Fair, Earl's Court, in June 1983. **But first you must prove you are worthy.**

Volcanic Dungeon is available on the **16K ZX-81, 48K Spectrum and Dragon 32.** An entry form is supplied with every game. (Anyone who already owns the original ZX version can enter by sending a SAE for an entry form.) **Order your copy NOW** from **CARNELL SOFTWARE, 4 Staunton Road, Slough, Berks. Only £5.00** including P&P. **Also available from good microcomputer stores.**

The 'Judges' decision is final and no correspondence will be entered into. All business associates of Carnell Software, and their relatives, are disqualified from entry. A copy of the rules of the Volcanic Dungeon championship will be supplied with the entry form.

SPECTRUM 48K : ZX81 16K SIX PART ADVENTURE



BLACK CRYSTAL

THE QUEST IS ABOUT TO BEGIN

The ultimate role-playing adventure for the SPECTRUM/ZX-81. You can become a warrior, elf or wizard on a quest to find and use the rings of creation: to destroy the Black Crystal and defeat the Lords of Chaos. Held within six programs lies a land of fabulous treasures and mythical monsters. Journey through the land of Beroth, explore the castle of shadows, descend into the Shaggoths lair, search for diamonds in the sea of sand but beware of sand sharks! Confront the fire demon in his temple, battle against the Lords of Chaos and win your way to the Black Crystal.

By splitting Black Crystal into six programs we can provide more variety and detail than any other adventure for the Sinclair computers.

Real time monster battles. Superb graphics. Save game feature. All six parts are supplied together on cassette, boxed with instruction booklet.

SPECTRUM 48K: 180K OF PROGRAM IN SIX PARTS — ONLY £7.50
ZX81 16K: OVER 100K OF PROGRAM IN SEVEN PARTS — ONLY £7.50
WHY PAY MORE FOR LESS OF AN ADVENTURE

To: **CARNELL SOFTWARE, DEPT 2, 4 STAUNTON RD, SLOUGH. SL2 1NT.**
Please send me: Black Crystal for my,

Spectrum 48K.................. £7.50
ZX8 16K....................... £7.50

I enclose a cheque/postal order (payable to Carnell Software) for £ ________

NAME..

ADDRESS.......................................

....

TRADE ENQUIRIES WELCOME

Great games for your Spectrum

from MIKRO-GEN the leaders in ZX games



Sorcerer's Castle

Takes you into a world of magic and mystery. Graphical position and a host of options with this exciting adventure game for the 48K Spectrum **£5.50**

NEW

Scramble

High-speed arcade game – the fastest available. Thrust, altitude, fire and bomb controls. For 16K or 48K Spectrum. **£5.50**

Masterchess

Ten levels of play + change sides or level in mid-game + set board to any position + scrolling history + displays your moves and computer's + copy display & history to printer any time + save game at any point + recommend move option + plays all legal moves + indicates illegal moves + Chess Clock on reverse. A powerful, adventurous and enjoyable 48K program **£6.95**

the program for the *real* player!

And for your ZX81:

Scramble ★ Frogs ★ PaintMaze ★ ZX Chess ★ Breakout ★ Space Invaders ★ Asteroids ★ Tempest ★ 1K Games-pack ★ Debug

All supplied on cassette with library case £3.95 (ZX Chess £6.50)

Write for full details of the Mikro-Gen range of programs and add-ons, available from local stockists or direct from the manufacturers (please make cheques/PO's payable to Mikro-Gen and add 40p post & packing)

Suppliers of Software to Sinclair

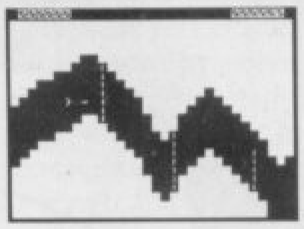
MIKRO-GEN

24 Agar Crescent Bracknell Berks RG12 2BK
Tel: Bracknell (0344) 27317

A TOTALLY NEW AND ORIGINAL GAME FROM SOFTWARE FARM FOR 16K ZX81

NEW!

the Super Scramble



YOUR MISSION

To penetrate the Witches Defences, Enter her Cavern and Destroy her wicked Heart

THE WITCHES DEFENCES

STALAGMITES AND STALACTITES which grow across your path. Blast a way through with your Lazer Cannon (but beware – a surprise is in store fore you!).
VOLCANOES to get past alive – if you can! – an ever increasing amount of white-hot Larva to avoid the closer you get to the witches cavern.
VAMPIRE BATS that cling to your ship, making your controls sluggish and finally (if you are not careful) dragging you down to your destruction.
CAVE-INS should you hit the side of the cave with your Lazer Cannon or Bomb, part of the roof will cave-in on you – the greater the landslides to avoid each time!.
THE NEARER you get to the Witches Cavern, the more of her Defences she will throw at you at once. Should you survive all of them (highly unlikely) then you must contend with the Witch herself! Avoid being turned to stone by her spells while attempting to destroy her wicked Heart!.

- *Written entirely in Machine Code
- *Hall of Fame
- *1 or 2 Players
- *Mystery Score positions to bomb
- *5 Skill Levels

DESTINED TO BECOME A CLASSIC!

AND ONLY £5.95

THE SOFTWARE FARM Dept. SU
CRAIGO FARM, BOTANY BAY, TINTERN, GWENT

AVAILABLE NOW FOR SPECTRUM*

University Software

LIBRARY OF ADVANCED MATH/STAT/ECON

TAPE 1 : MATRIX OPERATIONS — SPECTRUM £6.95, ZX81 £5.95
Side A: Inversion, multiplication, addition, subtraction and scalar multiplication of matrices and vectors within one single program. Any output can in turn be used as the input of the next operation without re-typing.
Side B: Determinants of square matrices.

TAPE 2: POLYNOMIALS — SPECTRUM £6.95, ZX81 £5.95
Side A: Includes quadratic equations (as degree 2 polynomials) and Newton-Raphson and half-interval search methods for higher degree polynomials. Computes the roots with 8 digits of precision.
Side B: You can plot polynomials in any interval and examine their roots, extremum points.

TAPE 3: INTEGRATION — SPECTRUM £6.95, ZX81 £5.95
Side A: Integration of functions by Simpson's and trapezoidal rules. Also computes the area enclosed by two functions.
Side B: Plot of integrals. Integration can be visualised on the screen.

TAPE 4: REGRESSION — SPECTRUM £7.95, ZX81 £6.95
Side A: A highly developed multivariate regression program featuring Log/Ln option on each variable (thus allowing exponential and geometric regressions), standard errors, t-statistics, F-statistic, degrees of freedom, Durbin-Watson statistic, interpolation.
Side B: Plot of bivariate regressions. You can see how your computer draws a best-fitting line on a set of numbered data points.

TAPE 5: LINEAR PROGRAMMING — SPECTRUM £7.95, ZX81 £6.95
Side A: A user friendly optimisation program capable of handling all sorts of linear programming problems (any combination of $\leqslant, =, \geqslant$, constraints and $x_i \geqslant$, $x_i \leqslant 0$, $-\alpha < x_i < \alpha$ sign constraints). Features the cannonical equivalent of the primal, values of slack variables and the dual.
Side B: Solutions of simultaneous equations.

- **PLEASE SEND US S.A.E. FOR THE WIDE RANGE OF SCIENTIFIC SOFTWARE* AVAILABLE TO ORDER**

- Cheques payable to: UNIVERSITY SOFTWARE 45/c Sloane Street London SW1X 9LU
- All incl. prices for first class P&P
- Delivery within a week of receipt
- Tapes 1 – 5 Spectrum £35 ZX81 £30

* 16K or 48K Spectrum, 16K ZX81

NEW

From Warp Factor Eight



Lift-off into '83 with HI-STAK

ONLY £3·95 includes VAT, p&p

- makes your computing easier, faster, more reliable, less exhausting and simply more enjoyable.
- angles your computer neatly to the correct ergonomic position for the most efficient keyboard operation.
- provides extra ventilation for hot ZX81's and Spectrums.
- instantly applied.
- styled for '83, adds that professional look to your set up.
- precision injection moulded in quality ABS, non scratch – non slip base.

ZX81
SPECTRUM
VIC20
TRS80
NEW BRAIN
JUPITER ACE
Etc.

Order form. Please send me____HI-STAK set(s) (at £3.95 per set). I enclose cheque/P.O. for__________

Name__________

Address__________

__________ Post code__________

To: Warp Factor Eight, Dept. SU.
6 Pelham Road, Braughing, Ware, Herts. SG11 2QU.

campbell systems

THE VERY BEST IN MACHINE CODE FOR THE **ZXSPECTRUM** & **ZX81**

All programs supplied double-recorded and mailed 1st class by return. Prices include VAT and postage within Europe. SAE for full list.

for 48K Spectrum **MASTERFILE** business/domestic filing and reporting system. So flexible that it is equally usable for your mailing lists, catalogues, stock control, text extracts ...... applications are endless. Fully user defined data and report display formats, dynamic variable-length file, records and data items. Fully menu-driven with powerful search facilities, sorting, total/average, update, multiple independent files, printing. Yes, we aim to support microdrive when Uncle delivers. Nearly all the 8K we use is machine code, so you get 32K per file. Comes with example file and 22 page manual. £15.00

NEW Masterfile-16 for 16K Spectrum owners. We have produced a subset version of MASTERFILE called MASTERFILE-16. It has most of the features of big MASTERFILE, with 7 pre-defined report formats and 6 pre-defined fields e.g. name, address, etc., and we have found a useful 4500 bytes of file space. MASTERFILE and MASTERFILE-16 are fully 'file-compatible' and will happily process each other's files, so that 16K owners who upgrade to 48K can use their old files immediately. Complete with 12-page manual, priced at £12.00.

PLEASE REMEMBER TO STATE CLEARLY WHICH VERSION OF MASTERFILE YOU REQUIRE.

for 16K Spectrum **GULPMAN** game of the '.....man' variety with 15 mazes, 4 chasers, laser defence, 9 grades, 9 speeds, demo mode, choice of joystick control. "An extraordinarily good program" raves Boris Allan for Popular Computing Weekly. We think you will agree. £5.95

for 16K ZX81 **GULP 2** almost identical spec to GULPMAN £4.75

for 16-64K ZX81 **THE FAST ONE** is the predecessor to MASTERFILE and is in use all over the world now. Specification is very similar to MASTERFILE. £12.00

Campbell Systems, Dept.(SU),
15, Rous Road, Buckhurst Hill,
Essex, IG9 6BL, England.
Telephone: 01-504-0589

CS

FOX ELECTRONICS
Products for the ZX-Spectrum and the ZX-81





IMPROVE YOUR MEMORY

with the ZX-Panda. The **uniquely** expandable 16K Ram Pack. Simply expanded to 32K by insertion of a plug in module. Specially designed to eliminate wobble, and complete with led power indication

16K expandable Ram Pack **£24.50** incl p + p
16K expansion module **£19.95** incl p + p
or 32K complete for **£40.00** incl p + p

NEW!

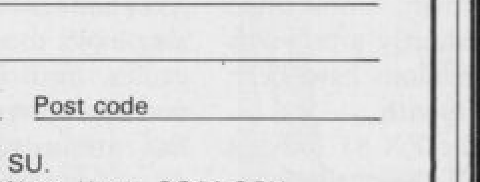
or go for the **Big Big** pack 64K only **£50.00**

The FOX **SPECTRUM UPGRADE** kit. (For issue 2 machines only) takes your machine to 48K, no soldering required and full instructions supplied.

UNBEATABLE VALUE AT £24.00

ZX-81 KEYBOARD (identical to Spectrum keyboard opposite again with ZX-81 PCB fitting inside, again without soldering a great buy at only
£29.95 + £2.50 p + p

SPECTRUM KEYBOARD –
A 42 key full travel keyboard which ZX printed circuit board simply screws into. (No soldering required).



£29.95 + £2.50 p + p.

ZX-81 KEYBOARD No.2

Alternately, go for the stylish and efficient, pushbutton, precision mounted (ABS as per your ZX-81) 3 coloured keyboard at an incredibly low price of **£10.00** incl p + p

Unit adheres direct to ZX keyboard
No soldering required.

Improve your games with the Spectrum Joystick professionally built from strong nylon and steel.
A must for all games lovers only
£25.00
£1.00 p + p.

NEW SOUNDS
For your Spectrum with the **new** programmable sound generator
£19.95
+ 50p p + p
or inexpensively enhance existing sounds with a sound expansion for only.
£6.95 + 50p p + p.

OR let your Spectrum do the talking with the **CHATTERBOX** phonetic synthesis, unlimited vocubulary, complete with speaker/amplifier and housed in a smart black box
ALSO for **ZX-81** both at
£56.00 incl p + p

COMING SHORTLY
The Spectrum Echo. Volume and tone control. Load and save without switching leads. Looks good. Sounds good.
£23.50 incl p + p.

Send now to
FOX ELECTRONICS
141 ABBEY ROAD
POPLEY 4
BASINGSTOKE, HANTS
Catalogue available, send S.A.E. All products guaranteed 1 yr. Overseas customers add a further £1.50 p + p to all items.
Delivery 10-14 days

New and varied life-forms now inhabit the Pacman maze. John Gilbert investigates.

Leading the Pac



PACMAN is part of what the video historians like to call the arcade maze craze. The game is set in a maze where a hungry little round creature eats dots and power pills scattered through the corridors. The monsters are ghosts which hunt the little man and will eat him if he is not agile enough to escape.

If, however, the Pacman eats a power pill it can chase and eat the ghosts. The original game was introduced to the home computer market by Atari, primarily on its VCS video system and then on the 400 and 800 computers.

The first versions for other computers, variously called Puckman, Gobbleman and Scoffer, arrived shortly afterwards and since then new versions have been released almost every month.

Not surprisingly, the ZX-81 did not escape the craze. The authors of **Zuckman,** from DJL Software, claim that it is the first version of Pacman for the ZX-81. The game runs in 16K and is written in machine code, which gives the scrolling routines and Pacman a smooth movement. That is something unusual on the ZX-81, as most games flicker slightly.

The game adheres as closely as possible to the original and the limited graphics of the ZX-81 do not matter much. One snag with playing the game on the ZX-81 is the membrane keyboard. Moving a Pacman around the screen using it can be difficult but not impossible.

At the beginning of Zuckman the ghosts speed on their victim and if you panic trying to find the keys and do not press them properly you are liable to lose a Pacman or crash the machine. Once you have a fair idea of the game, however, it is surprising how quickly you can move the Pacman around.

Zuckman is available for £5.95 on the 16K ZX-81 and Spectrum. **Super Glooper** is a version of Pacman, also for the 16K ZX-81, which is retailed by Sinclair Research. Glooper's task is slightly different from normal. Instead of gorging himself with power pills he has to paint the maze. Obviously the ghosts will not tolerate Glooper's antics — perhaps they do not like the smell of paint. The ghosts will try to kill Glooper as usual but if he can get round the maze and paint all the walls you have won.

The game is very amusing and is well worth £4.95. The program will load in less than two minutes, so you will not have to wait six minutes to play the game.

The launch of the Spectrum provided software houses with an excuse to try to produce the perfect Pacman which simulated the Atari version as closely as possible but Atari guards its rights over products jealously and investigated the products of several firms in the ZX industry.

The Abbex **Spookyman** game is the most famous of the Spectrum versions. It also looks most like the original. Most games, until now, have included only dots and power pills in the mazes. Abbex has included dots, power blobs, diamonds, hearts, clubs, mean-looking ghosts and a cute little Pacman which looks like a diamond turned on its side.

The keyboard is divided into three sections with left control on the left, right on the right, and up and down in the centre. The controls are very difficult to master but, once you have done so, usually with the aid of both hands, you will be surprised at the agility you can attain.

At times the game is almost impossibly fast but Abbex estimates that the highest score possible after every screen has been cleared is 22,400. If you manage to reach 10,000 points you will receive a bonus life. We managed to go that far only once.

Spookyman can be played by one or two players. If two play they take turns to control the Pacman. Their individual scores and the highest score are included at the top of the screen.

There are two unusual features in Spookyman. The first is that you can re-set the high score at any time between games; the second is that you can use a joystick. The game is compatible with the Kempston joystick and once you have seen it in action it is almost a necessity. Spookyman is available from Abbex and costs £4.95.

Gulpman is another variation on the Pacman theme. The round Pacman is replaced by a little man

running round the maze and the ghosts become frowning faces which smile only when they have caught Gulpman.

The game is very complex and you can switch to any of 15 mazes in which to play. It is also possible to change the tempo. At tempo one the speed is bearable but at tempo 10 life is not worth living.

The little man can fight back slightly more easily than in other games as he approches with a fully-loaded laser gun. If the ghosts get too close you can blast them away but only until your energy runs out. It seems as if the space age is over-running everything. Gulpman is available from Campbell Systems and costs £5.95.

Hungry Horace, from Sinclair Research, has developed a reputation as a fun game; in fact Horace is almost a legend. The game is a great improvement on the original and has remained at the top of the software top ten for some time.

Horace is a large purple blob which has sprouted arms and legs. He wanders around the maze which looks like a park, eating everything in his path and trying to avoid the guards who act like ghosts and try to capture him. He can scare away the guards by using the alarm bell situated somewhere in the maze.

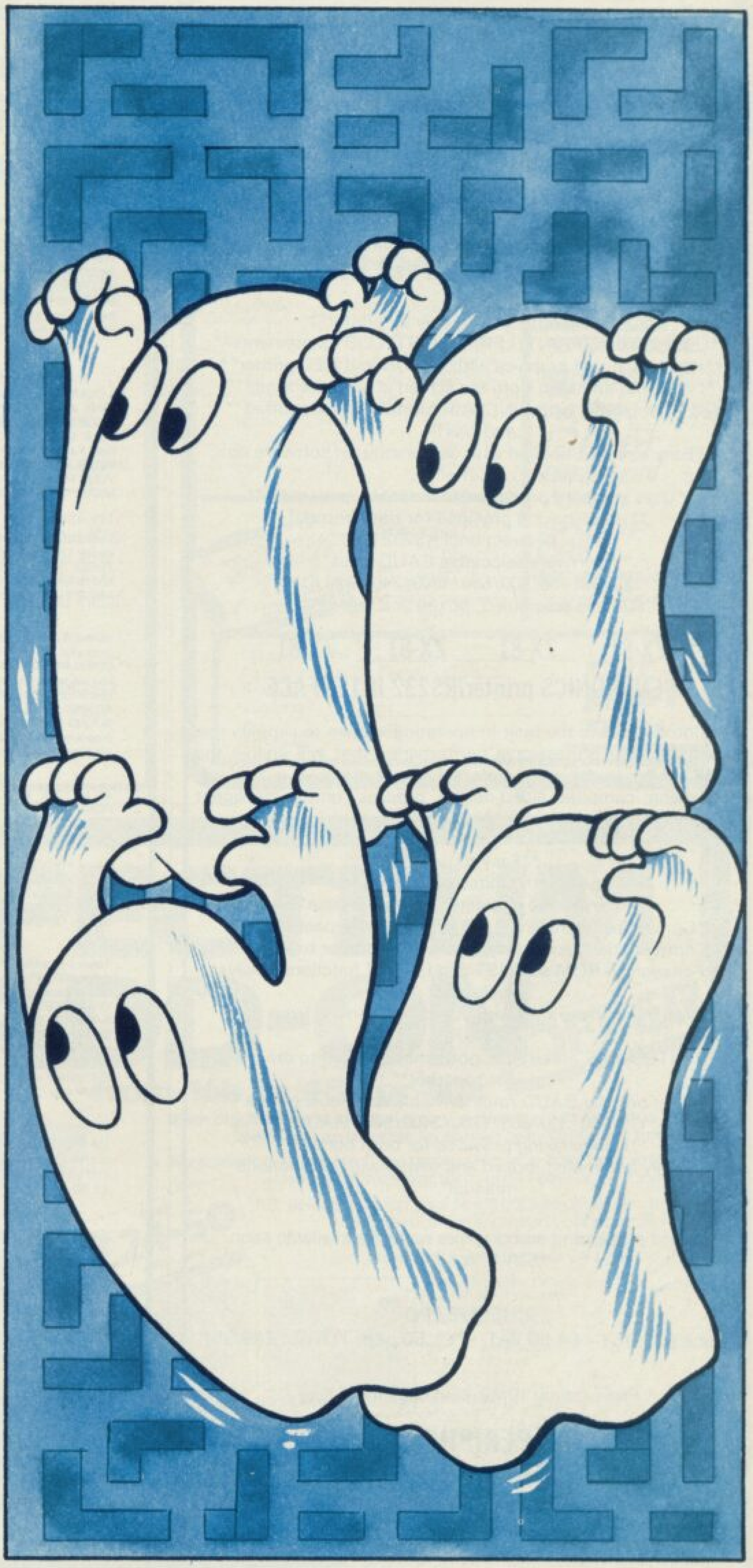
If Horace reaches the exit of one of the mazes he can enter the next maze and continue to the next exit. The mazes become more difficult as Horace proceeds further in his adventure and we managed to reach only the third maze. With a large amount of skill, however, it should be possible to go further.

Hungry Horace, for the 16K Spectrum, is available from Sinclair Research and costs £5.95.

Although the arcade industry in the States, and now in Britain, is declining it is good to see that games concepts like Pacman are being transferred to micros.

Some of the Sinclair versions of Pacman seem as good as, if not better than, the original Atari version. Games such as Hungry Horace are setting-up an interesting mutation in the Pacman concept. They also seem more interesting than the original version because they have added to the idea of Pacman. So far as the consumer is concerned it is to be hoped that concepts such as Pacman will not be destroyed within the industry.

DJL Software, 9 Tweed Close, Swindon, Wilts, SN2 3PU.
Sinclair Research, Stanhope Road, Camberley, Surrey, GU15 3PS.
Abbex Electronics Ltd, 20 Ashley Court, Great North Way, London, NW5.
Campbell Systems, (Dept. SU), 15 Rous Road, Buckhurst Hill, Essex, 1G9 6BL.



ZX SPECTRUM ZX SPECTRUM ZX SPECTRUM

CENTRONICS printer/RS232 serial INTERFACE

2 INTERFACES IN 1

To complement the 'best computer in the World' we have developed a superb interface. A CENTRONICS parallel *AND* a bi-directional RS232 interface in the same box.
Professional applications are now in easy reach.

Line length limited only by printer
Uses standard PRINT/LPRINT/LIST/LLIST statements
High resolution graphics with EPSON and NEC printer
Will print anything from the screen in graphics mode
Compatible with SINCLAIR printer and most other add-ons
Easy to use. Supplied with demonstration software on cassette
Uses standard printer cable available as an extra
Handshaking provided for both ports
Full bi-directional RS232 link
Software selectable BAUD rates
50/110/150/300/600/1200/2400 BAUD
Fully assembled, boxed and tested

ZX-81 ZX-81 ZX-81 ZX-81

CENTRONICS printer/RS232 INTERFACE

This interface uses the built-in operating system to simplify use giving a highly professional performance that will enable the SPECTRUM to be used for real applications, e.g., Word-processing, computer aided design, process control, intelligent V.D.U., etc, etc.

Easy to use
Line length limited only by printer
Uses inverse characters for lower case
Compatible with SINCLAIR printer, RAM packs etc.
Control codes can be sent to use your printer to the full
Firmware in ROM so LLIST and LPRINT functions always available
Will drive any printer with standard interface from your ZX-81
CENTRONICS and RS232 ports may be used to drive two devices together
Most popular BAUD rates available selectable by link
110/150/300/600/1200/2400/9600 BAUD
Handshaking provided for both ports
Fully assembled, boxed and tested with instructions manual

Word-processing and graphics software available soon.
S.A.E. for details.

CHEQUE / PO
Price £29.95 (+£4.50 VAT + £1.50 p&p. TOTAL: £39.95)

Please allow 10 working days for delivery

MOREX PERIPHERALS LTD
(Mail order only)

Dept. SU, 2 Balliol Road, Caversham, READING, Berkshire.
Tel: (0734) 478854. Telex: 849911 MOREXG

NEW SPECTRUM AND ZX81 SOFTWARE

"WINGED AVENGER"

Fast and furious. SPECTRUM version has SOUND and USER GRAPHICS. 7 LEVELS, 3 WAVES, MOTHER SHIP, HIGH SCORE, RE-FUELLING, RAPID FIRE, SMART BOMBS and LASER SHIELD. PCW "ONE OF THE BEST SINCLAIR GAMES YET". Only £4.50. All SPECTRUM + 16K ZX81.

"SPECTRUM SCRAMBLE"

MORE M/CODE ARCADE ACTION. "SO GOOD THE REVIEWERS DIDN'T REACH THE FINAL STAGE" (NOT BAD EH!!). NO LESS THAN 8 DIRECTIONAL KEYS for a SMOOTH MOVE. Full ARCADE features including, LASERS, BOMBS, INSTANT RESPONSE, CONTINUOUS SCORING, ROCKETS, SOUND, FUEL DUMPS, RED METEORS, DEFENDER CRAFT and HIGH SCORE. Beware CONDITION RED. With this one you MOVE, FIRE and BOMB AT THE SAME TIME. RELEASE PRICE of £4.95. 16K or 48K SPECTRUM.

"DO NOT PASS GO"
NOW THE 48K SPECTRUM VERSION IS READY

A COMPLETE SIMULATION of the BEST SELLING BOARD GAME, you know PARK LANE and all that. Up to SIX PLAYERS can compete with the MICRO doing all the WORK. Acts as DICE THROWER, BOARD, RENT COLLECTOR, UMPIRE, BANK, RULE BOOK, ACCOUNTANT and PROPERTY RECORD. SUPER GRAPHICS by Gary Kennedy (thanks mate). GAME SAVE with winner so far report. COMPLETE with INSTRUCTION BOOKLET. The ULTIMATE in FAMILY GAMES. Don't MONOPOLISE YOUR MICRO. AMAZE all your friends and family. (Can you see your GRANNY on a MICRO?) ONLY £6.95. 16K ZX81 VERSION ALSO £6.95.

"BASE INVADERS"

The ONLY ARCADE GAME EVERYBODY SHOULD HAVE. The SCREEN'S the same, THE INVADERS are the same, BUT you get a SHIELD and a CHOICE of THREE SPEEDS, (O.K., FAST or INCREDIBLE). GOOD SOUND, a HARD GAME, and GREAT GRAPHICS. COMPLETE your software collection for just £4.50. 16K and 48K SPECTRUM only.

"AUDIO SONICS"

WINNER of WIZZ KID 82. For the SPECTRUM. A.S. writes sound effects for your own programs. 26 PRE-SELECTED SOUND EFFECTS include TELEPHONE, POLICE SIREN, FROG, SPACE EFFECTS and OUTBOARD MOTOR. GO into MODIFY and you are presented with a display of SLIDER CONTROLS to adjust PITCH, RISE, FALL, BRISKNESS, DECEL, ACCELL, TONE, REPEAT RATE, STUTTER and DELAY. ADJUST the SLIDERS then INSTANTLY hear the SOUND CREATED. Call "THE SOUND ONE" and a program line will appear that is ready for insertion into your own programs. Hours of EXPLORATION. YOU WILL BE AMAZED what BEEP can DO. We are proud to offer this at £4.99. 16K or 48K SPECTRUM.

"SPECTRUM RENUMBER DELETE"

All M/CODE RENUMBERS ALL NOT PART. "YOU WON'T BUY A BETTER RENUMBER PROGRAM FOR THE SPECTRUM" JUST 600 BYTES. At £4.95. ALSO ZX81 VERSION.

"HIGH NOON"

When YOU'VE SAVED the GALAXY, SCRAMBLED or whatever else you do on your MICRO, what about a GUNFIGHT? Play the SPECTRUM or YOUR PALS. THREE LEVELS. FULL FEATURES, CACTI, COFFINS, WAGONS, RAPID or SINGLE SHOTS. SUPERB GRAPHICS. GOOD SOUND including DEATH MARCH. ESCAPISM on TAPE for JUST £4.50.

"DISPLAY"

Takes over when BIN and the DEMO tape left off. How would you like 273 different user defined GRAPHICS on a 16K SPECTRUM or a GRAND 336 for a 48K. All of these can be displayed on the screen at the SAME TIME. UDGs are stored as PAGES and any TWO PAGES may be exchanged in memory. FILES can be LOADED FROM or SAVED TO TAPE. LOAD into any page location. TURN a UDG ¼ turn, ½ turn, FLIP a SHAPE over, REVERSE a SHAPE, EXPAND ¼ of a CHARACTER into a full character, UP, DOWN, LEFT or RIGHT by one PIXEL. 5 SHAPE FILES are included on TAPE. INCLUDING a 64 CHARACTERS per LINE DISPLAY. COMPLETE with DEMO PROGRAM and INSTRUCTIONS. JUST RELEASED at £7.00. 48K or 16K SPECTRUM only.

"YAHTZI"

Up to SIX players allowed. Plays the classic DICE game of strategy. All electric scorepad complete with GARRY'S "CHUNKY LOOK" character set. All cheating and errors rejected by your electronic umpire. Update your games cupboard for £5.50. 48K ONLY.

"MATCALC"

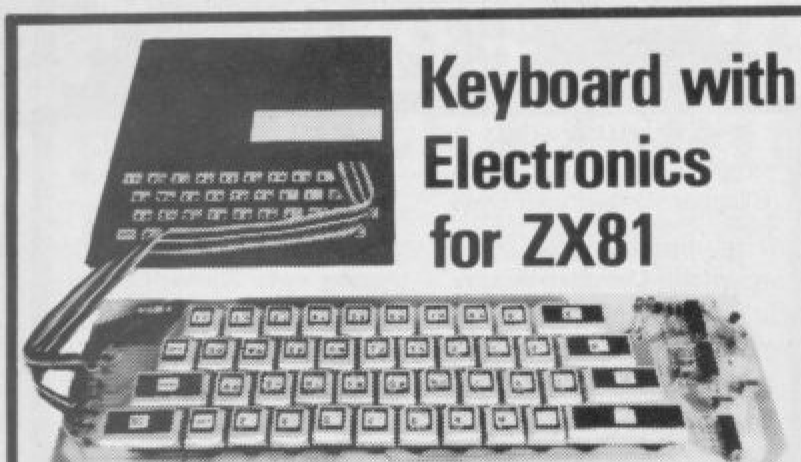
For BUSINESS and PROFESSIONAL use. Ideal for WHAT IF situations, CASH FLOW FOREC STS and analysing RELATED figures. 64 character display option. FORMULA may be MATHEMATICAL or LOGICAL. MENU of FUNCTIONS. SAVE and LOAD DATA to TAPE. FULL instructions included. LITERALLY HUNDREDS of USES. BOTH 48K and 16K SPECTRUM PROGRAMS on ONE TAPE. JUST £7.00. EXCELLENT VALUE.

"PROGRAMMERS DREAM"

A SPECTRUM TOOLKIT. Position independent and just 1450 BYTES. Facilities RENUMBER lines or blocks any increment or start. BLOCK OR LINE MOVE including a RENUMBER into place if required. BLOCK OR LINE ERASE. CHANGE SELECTED STRINGS (NAMES OR CONTENTS). DUMP variable names and values (usable in a loop). DISPLAY PROGRAM or PROGRAM plus VARIABLE SIZE. INSTANT and CLEAN. JUST £6.95 with explicit instructions.

WORK FORCE

140 WILSDEN AVENUE, LUTON, BEDS, ENGLAND
ALSO AVAILABLE AT BUFFER, MICROWARE AND SOFTWARE SUPERMARKET.
REM WORK FORCE WORKS HARDER.



Keyboard with Electronics for ZX81

A full-size, full-travel 43-key keyboard that's simple to add to your ZX81 and requires no soldering in the ZX81.

Complete with the electronics to make "Shift Lock", "Function", and "Graphics 2" single key selections making entry far easier.

Powered from ZX81's own standard power supply – with special adaptor supplied.

Two-colour print for key caps.

Amazing low price for complete build-it-yourself kit, only **£21.90** incl. VAT and carriage	Order As LW72P
Moulded Case **£4.95**	Order As XG17T
Built and tested, in case **£29.95**	Order As XG22Y
Full details in Maplin Project Book 3. Price 70p	Order As XA03D

MAPLIN Electronic Supplies Ltd

P.O. Box 3, Rayleigh, Essex SS6 8LR. Tel (0702) 552911

Retail shops at
159 King St., Hammersmith, London W6. Tel: 01-748 0926
284 London Rd., Westcliff-on-Sea, Essex. Tel: (0702) 554000
Lynton Square, Perry Barr, Birmingham. Tel: (021) 356 7292
(Shops closed Mondays). All mail to Rayleigh address.

DON'T MISS THIS INCREDIBLE OFFER!

50 GAMES £9·95



YES, 50 GAMES! on cassette for all the following:

GALACTIC ATTACK
SPACE MISSION
LUNAR LANDER
PLASMA BOLT
STARTREK
RADAR LANDING
ATTACKER
GALACTIC DOGFIGHT
ZION ATTACK
IVASIVE ACTION
OXO
BOGGLES
PONTOON
SKI JUMP
HANGMAN
OLD BONES
THIN ICE
MAZE EATER
ORBITTER
MOTORWAY
FORCE FIELD
NIM
TUNNEL ESCAPE
BARREL JUMP
CANNONBALL BATTLE
OVERTAKE
SITTING TARGET
SMASH THE WINDOWS
SPACE SHIP
JET FLIGHT
PHASER
INTRUDER
INFERNO
GHOSTS
SUBMARINES
ROCKET LAUNCH
PLANETS
BLACK HOLE
DYNAMITE
DO YOUR SUMS
DERBY DASH
SPACE SEARCH
UNIVERSE
RATS
TANKER
PARACHUTE
JETMOBILE
HIGH RISE
THE FORCE
EXCHANGE

sinclair SPECTRUM
apple (ON DISC & CASSETTE)
ACORN ATOM
BBC
DRAGON
ATARI VIC 20
SHARP
ORIC-1
NEW BRAIN
ZX81 LYNX



POSTAGE FREE TO U.K. ORDER DIRECT TO:

U.T.S.
P.O. Box 96
HARROGATE
NORTH YORKSHIRE
HG3 2UZ

PLEASE SEND ME ______
CHEQUE ENCLOSED, VALUE ______
NAME ______
ADDRESS ______
POSTCODE ______ G

cut & post now

FABULOUS! SPECTRUM ZX ADD-ON OFFER

from 16k to 48k or 80k

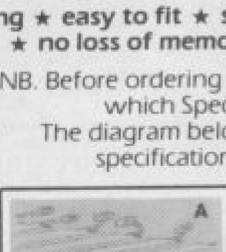
With our ME48 and ME80 memory expansion add-ons your ZX Spectrum can increase its capability by up to five times.

★ No soldering ★ easy to fit ★ simply plug in ★ fully guaranteed ★ no loss of memory through wobble or white out.

NB. Before ordering your Spectrum add-on please check which Spectrum you have in your possession. The diagram below clearly indicates the different specifications between the series A and B.



from **£24·50** + 40p p&p



At the back of the ZX Spectrum, the metallic contact strips can be clearly viewed. In the series A the space separating the strips is the same width as the strips. In the series B the strips are twice as wide as the space between.

ME48 Series A £34.50
Series B £24.50

ME80 Series A £49.50
Series B £49.50

Please tick the appropriate box to order your Computer Add-on. ME48 Series A ☐ Series B ☐
ME80 Series A ☐ Series B ☐ I enclose a cheque or postal order for
made payable/crossed to Computer Add-ons, or I would like to pay by Access
or Barclaycard and I enter my number accordingly. • Allow 28 days for delivery
Name
Occupation
Address
SU1

COMPUTER ADD-ONS
7-9 Thane Works, Thane Villas, London N7

COMPUTER ADD ONS

7-9 Thane Works, Thane Villas London N7

At last . . .
Exciting AND Challenging Computer Games for Two Players.

CONFLICT A total war for two players involving both the machinery (armies, missiles, warships) and finance (stock market, oil, piracy) of conflict. *"I enjoyed this strategy game" (Computer and Video Games).*

GALAXY CONFLICT Raise a fleet of Battle Eoncruisers then move from bridge to bridge taking full control and responsibility in this battle for the heavens. Born galactic rulers will do well. *"Galaxy battle sets new trend" (Sinclair User).*

Games Include — ZX81 (16K) and Spectrum (48K) programs on ONE cassette. Full size professionally printed board. Counters and markers. Two pads disposable maps (Conflict only). Comprehensive instructions/rules.

✱Professionally packaged in high quality attractive box.

✱Each game only £11.95 inc. Postage or £22 for both games.

✱Available from W. H. Smith, Buffer, Games Centres and many other retail outlets or mail order from:

martech games

9 Dillingburgh Road, Eastbourne
East Sussex BN20 8LY



R & R

STAR TREK 48K

Rid the Galaxy of the evil Klingons, Protect your Star Bases from attack. *("Easy to play. Difficult to beat". Sinclair User Dec '82)*



ONLY £4.95

16K Spectrum GOLF

Hi-Res Full colour graphics. A game for 1 or 2 players, All the features of a full size course. THE family game. *(Reviewed Sinclair User Oct '82)*



ONLY £3.75

P-E-P

THE PROGRAM ENHANCEMENT PACKAGE FOR THE ZX81 (16K)

A suite of easy to use machine code routines designed to transform your Basic programs.

- **DEFINED SCROLL REGION** 1 line to whole screen
- **SCROLL** up or down
- **FILL SCREEN** any character
- **CHANGE BACKGROUND**
- **CHANGE FOREGROUND**
- **INVERSE VIDEO**
- **FLASH SCREEN**
- **CLEAR SCREEN** without changing print position

Supplied on tape with a **6K DEMO PROGRAM** and a **FULL** instruction booklet

ONLY £5.95

GNASHER 16K

THE ULTIMATE MAZE GAME. Ghosts, Energy Pills, Bonus Fruit, Sound, Colour + much more. Starts easy, Becomes impossible.



ONLY £4.95

Send to: **R & R SOFTWARE (SU)**
34, Bourton Road,
GLOUCESTER GL4 0LE
Tel: GLOS (0452) 502819

48 HOUR DISPATCH
Overseas + 10% please
Large Dealer Discounts

ZX SPECTRUM

ZX SPECTRUM POCKET BOOK

160pp **£6.50**

Trevor Toms, best selling author of the ZX81 Pocket Book and the Sinclair Learning Lab, turns his attention to the ZX Spectrum — the book you have been waiting for! All the material in the book is totally new.

Programs

- Castle walls; boiling oil and lovely slurping noises
- Great Fire of London; try and change the course of history
- Chase; outwit the pursuing robots and lead them to their doom
- Truly amazing; generate a new maze puzzle every go
- Reversi; the classic oriental strategy game with board screen display
- 3D Maze; race against time and three dimensions to escape.

Also Available

ZX81 Pocket Book 138pp	£5.95
ZX80 Pocket Book 128pp	£4.95
Atom Business 110pp	£7.50

Hints & Tips

Discover new ways of using PRINT; INSTR functions, VAL, PRINT USING, hexadecimal conversion, upper case conversion, load and save arrays. BEEP with sliding tones, automatic scroll and how to use all the machine features within machine code.

Machine Code

All the tools you need to write machine code effectively. Graphics tool kit — debug monitor — symbol assembler (with labels, all ED commands, ORG statements, forward and relative jumps) — disassembler (with label assignment); now you can really dig into the Sinclair ROM! This section alone would be stupendous value for money!

Cassettes	Spectrum games as opposite	£5.00
	Spectrum machine code as above	£5.00
for ZX81	Nowotnik Puzzle, Demolition & Tenpin	£5.00
	3 Adventures: Greedy Gulch, Magic Mountain, Pharaohs Tomb	£5.00
Prices include VAT	ZX81 Pocket Book Cassette	£5.00

PHIPPS ASSOCIATES

Dept B FREEPOST EM463 (No stamp required)
99, East St, Epsom, Surrey KT17 1BR.
Telephone 03727-21215. 24hr phone service.

Prices include postage but for air mail delivery in Europe add 90p (outside Europe add £2.20) per item.

Profiting from sailing the ZX-81 China Seas

LIFE on the China Seas can be exciting, so long as you do not owe money to the money-lender in this game for the ZX-81. **Taipan** appeared originally as a program in *Sinclair User* but now the author has decided to retail it.

The object is to sail round the ports of Hongkong, Singapore, Macao, Bangkok and Shanghai, to earn money from the sale of goods to the populace. Some of the cargos you will carry are strange and exotic, including general goods, arms, silk, opium — and even women.

The game takes account of three ranks of trader — beginner, experienced trader and financial wizard. We do not know of anyone who has reached the financial wizard stage without owing plenty of money to the wicked Chinese moneylender, Sum Yan. One of the troubles of being a trader is that Sum Yan may send some of his 'boys' to beat the money out of you.



When the buying and selling has finished at one port it is possible to go to another using the Quit command. The prices of goods there may be higher than at the port you have left and you may make plenty of money.

As you travel from one port to another the interest on the money owed to Sum Yan increases, so it is a good idea to return to your home base of Hongkong and pay back some of it.

The promise of money and power in China proved false for us because we were never out of debt. That ensured that the game attracted some new addicts.

Taipan is available from Jaysoft, 6 Wentworth Drive, Bishop's Stortford, Herts. It costs £4.95.

Addictive frogger

FROGGER is an arcade game which has caused a good deal of interest among Sinclair users and the software industry in general. The attitude seems to be that if you are a big software house you must have a version of this amphibious game.

The version produced by DJL Software for the 16K ZX-81 is a good example. The frog hops across the road and then across the river to the safety of the home enclosure. When the last jump is made a large smiling frog plops into view on the far side of the river.

The dangers facing the frogs and their offspring include the cars on the road and the logs, turtles, diving turtles and alligators of the river.

There are five frog homes to fill but a player can score points just by moving a frog forward. You have three to move and if one is hit by a car or drowned you lose a frog. If, however, you manage to get one home safely you will get an extra hopper. If, by some miracle, you get 5,000 points, you will be given an extra life.

Frogger is very addictive and the membrane keyboard in no way hampers play. The program can be obtained from DJL Software, 9 Tweed Close, Swindon, Wilts., SN2 3PU. It costs £5.95.

Adventure innovation

THE BLACK CRYSTAL is one of the first graphic adventures for the 48K Spectrum and 16K ZX-81. The plot of the adventure, which is played in six parts, is to destroy the evil **Black Crystal** with its malign intelligence before you are destroyed by the Lords of Chaos.

To do so you must get through six maps on which you can move your little player, using the cursor keys. On the first map you must find some rings of power to enter the castles on that map. When you find the rings you may go through the door of the Castle of Shadows or into the dark domain of Shaggoth's Lair.

You must struggle around hidden mazes, fight dragons, and avoid deadly mists. The final conflict is between you and the Lords of Chaos. If you win you will destroy the Black Crystal and peace will reign in the land. If you fail, you and the inhabitants of the land will be doomed to eternal torment.

The Black Crystal is an excellent graphics adventure and

continued on page 36

Roman empire building



SIMULATION of ancient wars between old-world empires has become a speciality of the software house M C Lothlorian. **Roman Empire,** for the 16K Spectrum and ZX-81, is the new Lothlorian product. The game is set in the first century BC. As Emperor of Rome you have to conquer six hostile countries. Those countries are regarded as hostile because you do not rule over them.

At the beginning of the game you are given five generals, each with an army under his command. The armies are your ticket to absolute power. As well as the five armies you also have 10 legions, each comprising 5,000 soldiers. From those legions you can stock your armies in such a way as to make sure you will be the conqueror. The way in which you distribute the legions is an important factor in winning the game.

There are three levels of play, ranging from difficult to impossible. We have managed to keep our power-base only in the first two levels. When you have entered the level of difficulty you must build your armies and send them against the countries of you choice.

Matching armies is a skill which is not acquired easily. If you put the wrong army into an area which contains an enemy army of greater strength you will be eliminated. Roman Empire costs £5.50 for the Spectrum and £4.50 for the 16K ZX-81 from M C Lothlorian, 4 Granby Road, Cheadle Hulme, Cheadle, Cheshire SK8 6LS.

continued from page 35
a well-though-out package. There are two cassettes in the box and an introductory booklet giving the history of the Black Crystal, as well as instructions and hints on play.

The game has good quality graphics. The Black Crystal is available from Carnell Software, 4 Staunton Road, Slough, Berkshire. The package is reasonably priced at £7.50.

Spectrum compiler

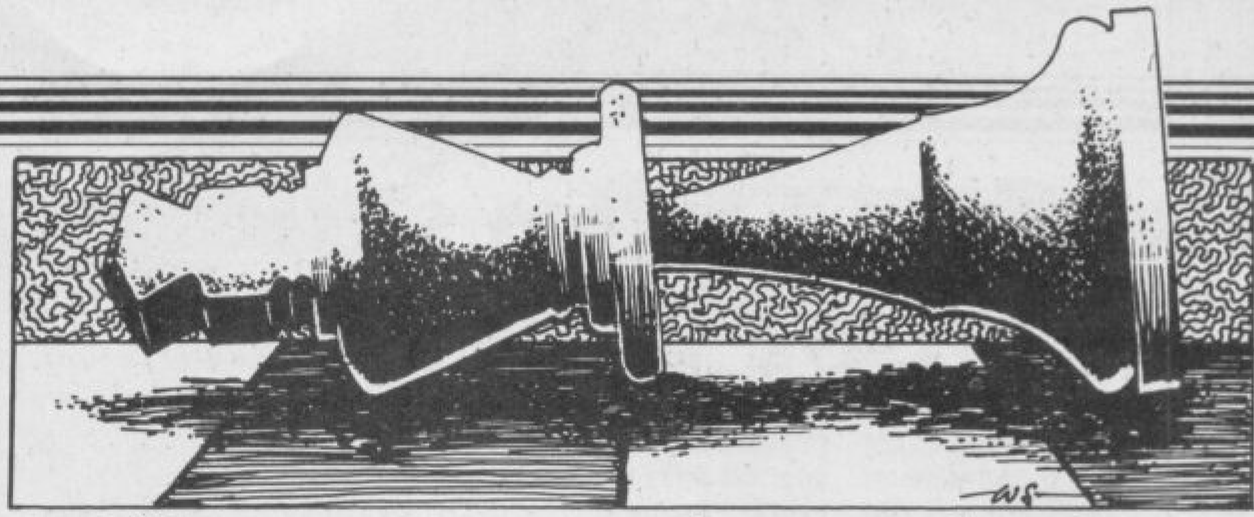
MACHINE CODE compilers are starting to creep on to the Sinclair scene. The Softek compiler for the 48K Spectrum is called **Super C.** The manufacturer claims that the code compiled from Basic into machine code will run faster than many other languages, including Pascal and Forth. The program will compile approximately 90 percent of the Basic language commands.

The problem newcomers to machine code may have is how to use arrays and variables within compiled programs. The compiler cannot handle string or numeric variables or arrays.

If the user knows something about machine code the situation can be remedied by setting-up a data area in memory with all the variable values set in it.

Super C has an instruction booklet which includes tips for modifying Basic programs to run without using statements which cannot be compiled. Compiled programs can be run easily by typing RUN instead of having to worry about RAND USR.

The compiler is useful in programs which use animated graphics but, until Softek produces promised modifications, the program may prove difficult to use for some beginners. The Super C compiler costs £14.95. It is available from Softek, 329 Croxted Road, London SE24.



Mikro Gen chess helps to defeat itself

MASTER CHESS, from Mikro Gen, is one of the best chess programs available for the 48K Spectrum. The game allows the user to play at one of 10 levels, numbered from zero to nine. The computer will respond with its move almost immediately in mode zero but the computer move in mode nine can take several minutes.

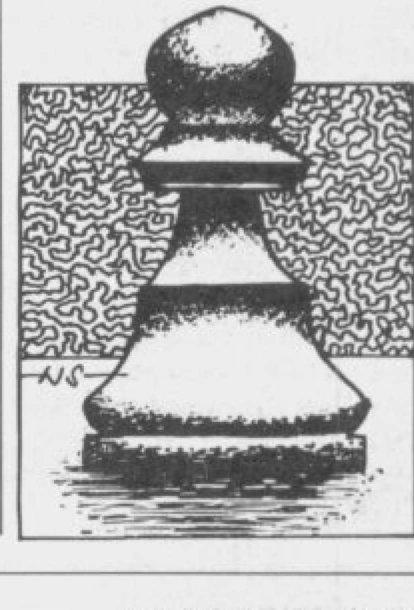
If a player is stuck in a position, the computer will suggest a move. In effect, the computer will recommend to its opponent the best move to make against itself, which shows that computers have no brains. The program also allows you to set up the board before playing the rest of the game.

The board can be cleared and a flashing cursor will appear on one of the board squares. Entering the appropriate letter, for example 'p' for pawn or 'k' for king, will make the computer place that piece on the square with the cursor.

When the board is set up with all the pieces in the order the player requires, the game will continue after selection of colour and level number.

A record of the moves made is kept on the left-hand side of the screen. If the player makes an illegal move the computer will not permit it and if the player wants to make another move instead of the one last entered, that move can be deleted.

The game is capable of pawn promotion and *en passant* and is one of the best versions of chess for the Spectrum. **Master Chess** can be obtained from Mikro Gen, 24 Agar Crescent, Bracknell, Berkshire. It costs £6.95.



Code-cracking wins contest



THE KRAKIT competition, launched in England by Artic Computing and in the U.S. by an American publishing firm, has generated a good deal of interest in the software business.

The program you have to buy to enter the competition is different from any other we have reviewed, because it lists only a series of riddles and allows you to store the answers which you have for them.

The ZX-81 version is loaded in two parts. The rules are given first, along with a fairly impressive graphic animation display of a key turning in a lock. The computer shows a menu to the competition entrant, from which you can find how to fill in the entry card you receive with the package, see an example riddle and how it is solved, or go to the second part of the program which lists the riddles.

The second part reveals the 12 clues. The entrant will need to find the name of a country, a name for a town and a number.

We looked at all the questions and the easiest seemed to be question two which, with a little help, we think we have solved.

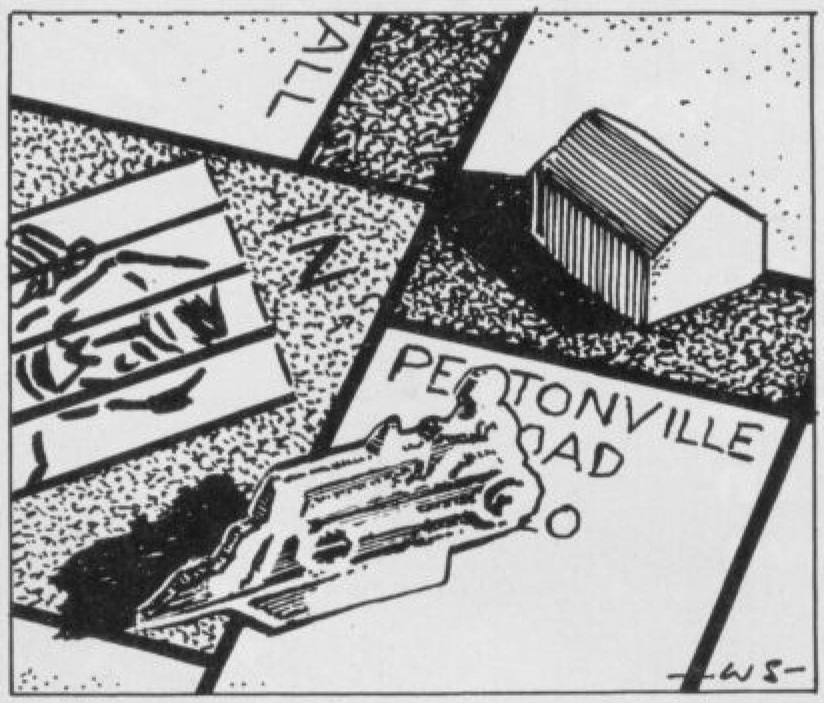
Krakit is available from Artic Computing, 396 James Reckitt Avenue, Hull, North Humberside. The program is available for the ZX-81 and the Spectrum at £9.95.

Work Force fun

SOFTWARE HOUSE Work Force has produced three very entertaining games and one very helpful toolkit package for the 16K and 48K Spectrum.

Base Invaders is one of the most addictive space invader games we have reviewed. It is difficult to beat, unlike some other games we have received in the last few months. The authors have also included a shield for the laser bases at the bottom of the screen which can be activated if the going becomes difficult. **High Noon** is the best version of Shoot Out we have seen either for the ZX-81 or the Spectrum. The animation achieved as the two gunfighers try to shoot down each other among the cacti and the wagons is very smooth. The game can be played with a human opponent or with the computer. Both games are for the 16K or 48K Spectrum.

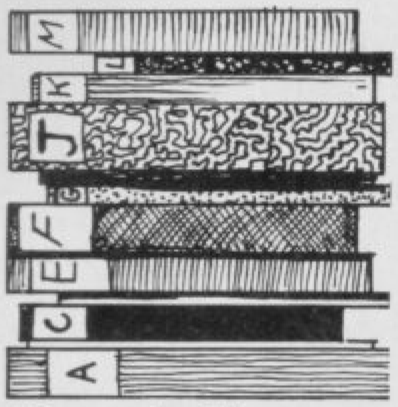
Do Not Pass Go is a version of that popular board game over which Waddingtons seems to have a Monopoly. The game is the same in most respects and the computer acts as the banker, debt collector and property broker. The computer will allow two to six players to try to find the road to riches — or rags as the case may be. Do Not Pass Go is for the 48K Spectrum.



The toolkit for the 16K and 48K Spectrum is called **The Programmer's Dream.** It will re-number programs, move blocks of lines to other parts of a program, erase one line or blocks of lines, change the values of strings in a program, list variable names and contents of a program, and display the size of a program and the amount of memory used to store variables.

The program is ideal for Basic program development work and works like a dream.

Base Invaders and High Noon are available for £4.50 each. Do Not Pass Go costs £6.95 and The Programmer's Dream £6.95. All can be obtained from Work Force, 140, Wilsden Avenue, Luton, Beds.



Campbell masterfiles Spectrum

ANYONE who has used **The Fast One,** a filing system for the ZX-81, and has now upgraded to the Spectrum will be pleased to hear that Campbell Systems has a similar program, **Masterfile,** for the 48K Spectrum. The author describes the program as a business and domestic filing system which allows files to be SAVEd and LOADed independently of the program.

The program is menu-driven. Files are made up of records which can be designed in any way the user chooses. Each record can contain up to 26 items of up to 128 characters for each item.

There are several options which allow the user to manipulate a file or a record. They include searching by character or numeric value, updating or copying a record, totalling or averaging items, and erasing records.

If a user has special requirements the program can be tailored to suit through the User Basic option. The program is also open-ended. That means a Microdrive option can be written into it.

On average, there is 32K of memory space available for data storage. That makes the system ideal for business use so far as memory is concerned but for full advantage the program needs to be run with a mass storage device, such as the Microdrive, with fast access to large amounts of data.

Masterfile is available from Campbell Systems, 15 Rous Road, Buckhurst Hill, Essex, 1G9 6BL. It costs £15.

Making beep music

MAKING MUSIC from the Spectrum BEEP command seemed almost impossible a short time ago but now PDQ Software has a package called **Spectsound** which will turn the computer into a mini electronic organ.

The package, for the 48K Spectrum, contains a cassette, an instruction booklet, and a keyboard overlay. The overlay shows the notes which can be generated; the keys to switch to an octave higher or lower; and operation keys to generate random notes; delete notes; change the duration of a note; delete the whole tune in memory and play the tune so far in memory. The sound from the Spectrum is not amplified in any way using the package but the introductory booklet provides the user with ideas how to increase the output.

It is possible to store tunes and to load them back into the Spectrum. It is also possible to display the numbers which correspond to the BEEP statements necessary to construct the tune in a separate program.

Spectsound is excellent value at £5.95. It can be obtained from PDQ Software, Parsley Rye, Hilders Lane, Edenbridge, Kent, TN8 6JU.



THE INVASION HAS BEGUN

The assault on your senses has begun with a great choice of games that have been created to give you a real challenge!



Post coupon now to Imagine Software, Masons Buildings, Exchange Street East, Liverpool, Merseyside L2 3PN.
Please rush me copies of (tick box)
☐ Arcadia ☐ Schizoids ☐ Ah Diddums
(for any ZX Spectrum)
Please debit my Access/Barclaycard (delete as necessary)
Card Number
I enclose Cheque/PO for £
Name
Address
SU4

SUPERFAST CREDIT CARD SALES LINE: 051 236 6849 (24hrs)

Any of these games for just **£5.50 EACH** including first class post, packing, VAT and an UNCONDITIONAL LIFETIME GUARANTEE

When you buy Imagine Software you buy it for life. If an Imagine Software product EVER fails to load first time simply return it to Imagine for an instant free replacement.
All orders despatched by first class post within 24 hours of receipt. Subject to stock availability.
Why not put a first class stamp on your envelope and you will receive your order within 3 days of posting.
Available from all good software outlets.

dealership enquiries contact: Mark Butler

Imagine Software



...are, Masons Buildings, Exchange Street East, Liverpool, Merseyside L2 3PN.

Use your computer in the case...
Foam rubber gives complete protection...
Purpose-built for ZX systems...

Spectrum and ZX81 Custom Cases.

Just £34·95 (+P&P) each.





Turn your ZX system into a portable computing centre!

Your ZX hardware – ZX81 or Spectrum – is designed to work together as a system.

And now there's a simple way to make the most of the fact.

The portable computing centre in a briefcase.

A ZX Custom Case holds all your hardware in the most ergonomically sensible positions for easy operation. Each piece of equipment is gripped securely by shock-absorbing foam. Each connecting lead fits under the foam, so there's no chance of tangles. And as each piece is held firmly, connections are excellent.

You can forget wasted time setting up or unhooking the system, too. When you've finished, simply tuck in the mains and TV leads and replace the hinged, lift-off lid. And of course, if you're taking your ZX system to college or the office, ZX Custom Cases are a lot less cumbersome than a bag or rucksack. And a lot more protective and professional.

Designed by ZX enthusiasts – for ZX enthusiasts.

Both the Spectrum and ZX81 Custom Cases were designed by a group of ZX system users and manufactured by Britain's leading case makers. Made from impact-resistant ABS, each case holds every piece of Sinclair hardware available for the respective computers – plus Learning Lab, manual, software cassettes and any cassette player up to 10½" x 5½". If you haven't all the hardware, simply leave the pre-cut foam in position, then remove it as you get extra pieces of equipment.

And when brand new hardware is introduced, or you upgrade from ZX81 to Spectrum, simply contact us for a replacement foam insert for just £4.95 (+p&p).

ZX81 Custom Case also available!



Send for your ZX Custom Case – now!

Spectrum and ZX81 Custom Cases are guaranteed for two years, and cost just £34.95 (+p&p) each. Remember you could pay more for an ordinary briefcase.

To order, simply use the FREEPOST coupon. Or if you have a credit card, telephone 0276 62155, Mon-Fri, 9.30-5.30.

COMPUTEX CASES

Computex Cases (JBS), Stanhope Road, Camberley, Surrey, GU15 3PS.

Please allow 28 days for delivery. 14-day money-back undertaking.

To: Computex Cases (JBS), FREEPOST, Camberley, Surrey, GU15 3BR.

Please send me ______ (qty) Spectrum Custom Case(s) at £36.95 (inc. £2.00 post, packing, insurance) each. **02.**

Please send me ______ (qty) ZX81 Custom Case(s) at £36.95 (inc. £2.00 post, packing, insurance) each. **01.**

*I enclose a cheque/P.O. for £ ______ made payable to Computex Cases.

Please debit my Access/Visa* account no. ______

*Please delete as appropriate. PLEASE PRINT.

Signature ______

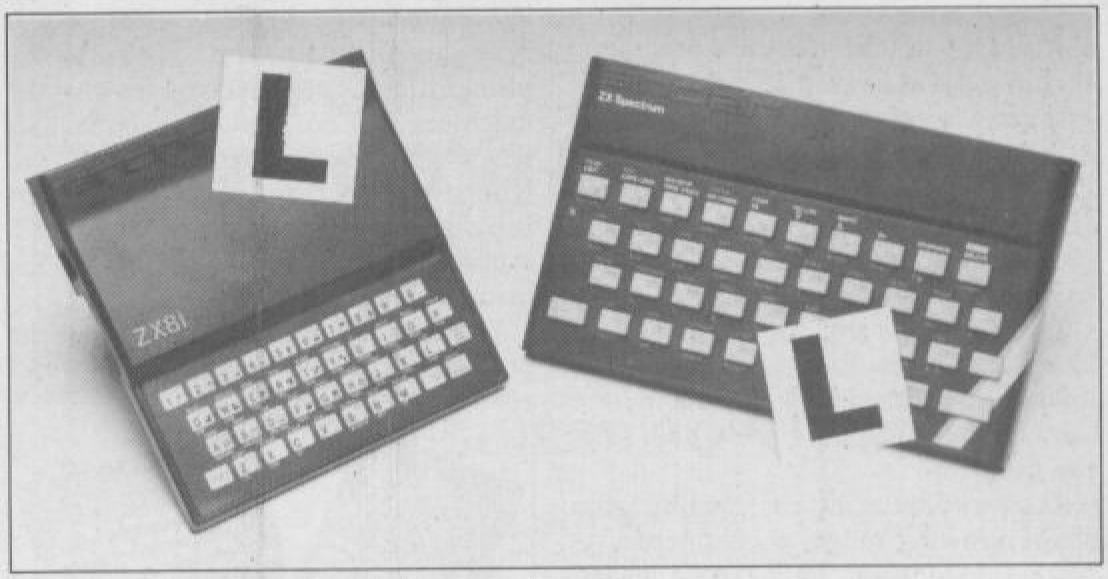
Name: Mr/Mrs/Miss ______

Address ______

Reg. in England no: 991288. SUS 304

GLOSSARY

Basic — Beginners' All-purpose Symbolic Instruction Code. A programming language resembling English which is used by beginners because most popular microcomputers have it as standard.
Bug — an error in a program.
EPROM — Erasable Programmable Read-Only Memory. Semi-permanent storage. Information is not erased if the power is turned off in the computer. Programs can be erased by subjecting the memory chips to ultra-violet light. The memory can then be re-programmed using an electrical device called an EPROM blower.
Interface — RS232 and Centronics. A device which enables other computers or add-ons, such as printers, to be connected to the computer. It converts non-standard signals from add-ons to the standard signals of the computer in use.
Kilobyte — (K). A measurement of memory size. Most machines use 16K as a minimum but 48K is generally agreed to be necessary for serious work.
Machine code — an electronic pulse code used by the computer to perform functions and communicate with memory and other devices.
Mnemonics — abbreviated instructions — for example LD for Load — used in machine language programming.
Motherboard — an external printed circuit board which is used like a multi-way plug planner. It enables other printed circuit boards, such as graphics boards and colour boards, to be slotted-in.
Port — a link to the outside world which can be used by programs and the computer.
PCB — printed circuit board. A board which has on it the electronic circuits of the computer.
RAM — Random Access Memory. Information and programs can be stored in this type of memory as electronic pulses which conform to a set of numbers — machine language — in which programs are represented in the computer. When the power is turned off the information will be lost.
ROM — Read Only Memory. Information stored in this type of memory is not lost when the power is switched off.
Software — programs which control the operation of the computer.
Syntax error — a bug caused by incorrect use of a programming language.



Our easy-to-follow guide for new owners

The basic route to a habit-forming hobby

BUYING a Sinclair machine can be the start of a life-time's obsession with home computing. It is easy, however, to become discouraged if everything does not go according to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the machines is to abandon any ideas for special uses. While the 48K Spectrum is big enough for simple uses in small businesses, the range of Sinclair computers does not contain machines for major uses. It is better to become accustomed to the many facilities and then decide how you wish to use them.

Begin by unpacking your machine, overcoming your surprise at its size and weight and, following the manual, set up the system. If you cannot get the K on the screen, check that everything is plugged into its correct socket and re-set the machine by pulling-out the power plug for one second and try tuning-in again. If still nothing appears, check the power supply unit by shaking it. If it rattles, return it. If it is satisfactory, check your system with that of a friend.

If you have a Spectrum you will have received an introductory booklet which explains what the computer can do and giving detailed instructions on how to set it up. Also included is a fault-finding guide.

Once the K appears you are ready to begin learning about your machine. It can prevent family arguments if you can afford a separate television set for your system. It also makes life easier if you find somewhere to leave your equipment set up permanently: You will find that a few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy trailing leads.

When using a Spectrum, a television set has to be more finely-tuned than when using a ZX-81 because of the added dimension of colour. If the set is not tuned properly, the colours will look hazy instead of sharp and clear. If no colour can be seen when it is switched on, the power supply or the television set may be at fault.

Some users have experienced some difficulty with some television sets, which include Hitachi, Grundig and Toshiba. Sets which many people have found compatible include the Sony Trinitron, Fidelity and Ferguson.

The manuals are written in great detail and are reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something important.

Patience is needed at that stage to learn the ways in which the computer will accept information. It is tempting to try to enter programs before you are ready but that is likely to lead to errors. For example, words like AND, THEN and AT should not be typed-in letter by letter.

By the time you have reached chapter 11 in the ZX-81 manual and chapter 19 in the Spectrum manual you should have accumulated sufficient knowledge to be

continued on page 42

continued from page 41

able to type-in other people's programs, such as those in *Sinclair User* and *Sinclair Programs*, without too much difficulty.

It is that important when using the ZX-81 that it is not jolted. Some of the connections can easily work loose and everything which has been entered will be lost.

The manuals are not to everyone's liking and if you find them difficult to follow a number of books on the market can help you. Find the one which suits you best.

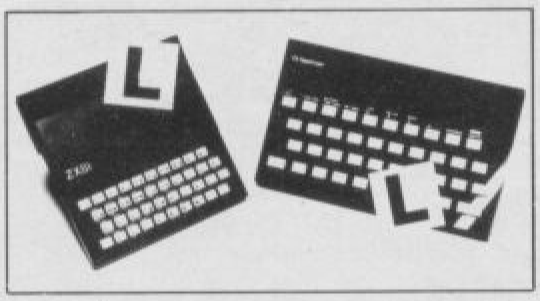
As a way of relaxing you can buy some of the growing range of commercially-produced software. That can be loaded directly from cassette but make sure that your machine is big enough to take the tapes you buy.

For the ZX-81 there are a few tapes for the unexpanded 1K machine but the majority require the 16K RAM pack. Similarly on the Spectrum most companies are taking advantage of the possibilities provided by the larger 48K machine rather than providing cassettes for the 16K.

The tapes can vary in quality and it is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

An alternative method to learn about both the ZX-81 and the Spectrum is to plunge in at the deep end and see what the machines will do. Refer to the manuals when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machines.

You may already have heard about the problem involved in SAVEing and



LOADing your own cassettes. The manual gives detailed instructions but many of the early ZX-81s would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties.

Usually they occur when LOADing tapes recorded by other people. One simple method to overcome this is to wind the tape to the middle of the program and type LOAD "" followed by NEWLINE; then increase the volume of the recorder slowly with the tape running until the television screen shows four or five thick black bands. If you then re-wind the tape, the program should LOAD normally.

LOADing and SAVEing on the Spectrum is much easier and faster than the ZX-81. One difference is that when SAVEing on the Spectrum the LOAD lead must be disconnected either at the recorder or the Spectrum.

Finally, a health warning. Apart from any practical uses, computing with your Sinclair machine can be a very entertaining hobby and is almost certainly habit-forming. You may easily find yourself crouched over your machine, red-eyed, in the early hours of the morning thinking that in another five minutes you will solve the problem. Try to break that habit by getting into the fresh air and meeting other Sinclair users.

By obtaining a Sinclair computer you find that you have joined a not very exclusive club with many thousands of members, many of whom would be only too happy to advise you if you have difficulties.

Make sure of your regular copies of *Sinclair User* and *Sinclair Programs* and you can be guaranteed many happy hours.





GAMES SOFTWARE ZX81

- **ARCADE ACTION 1K**
  Greedy Gobbler, Missle Man, Spacefighter Pilot, Extra Terrestrial, Overtaker. Outstanding graphics with continuous score £5.95
- **ZX CHALLENGE 1K**
  Competitive Games: Brands Hatch, Juggler, Meteor Storm and more £5.95
- **ADVENTURE 16K**
  64 Quadrant Galaxy, Scanners, Hyperspace £5.95

ALL ABOVE BY MICROMEGA

16k ZX81 or 48K SPECTRUM

- **BLACK CRYSTAL** £7.50

BUSINESS SOFTWARE ZX81

- **BANK ACCOUNT 16K**
  Powerful editing to update entries.
  Full user manual £9.95
- **INCOME TAX 1K/16K**
  (1982/83 Tax Year) Check your own tax.
  No technical knowledge required £9.95
- **BUDGET FORECASTER 16k** £9.95
- **INVENTORY FILE 16k** £9.95

SPECTRUM

- **BANK ACCOUNT 48K** £7.95
- **ADDRESS DATABASE 16K/48K** £7.95
- **CASHCALC WIZARD 48K** £7.95

ORDER TWO AND DEDUCT £1

& hardware upgrades

- **COMPUTER CASSETTES** High quality AGFA tape, screw assembled. All sizes available
  eg C15 - PACK OF 10 - £5·60/ PACK OF 20 - £9·20

- **ZX99**

AUTOMATIC TAPE CONTROLLER FOR ZX81



DATA PROCESSING – software control of up to four tape recorders
RS232C INTERFACE – allowing connection with any such printer using the full ASCII character code
AUTOMATIC TAPE COPY – copy of data file regardless of your memory capacity
TAPE BLOCK SKIP – without destroying the contents of RAM
ZX99 SOFTWARE available

£49.95

☐ ALL PRICES INCLUDE VAT AND P & P



- **STAR PRINTER**

This professional printer works with almost any computer with very good upper and lower case typeface.
* Bi-directional & 80 column width (10" paper)
* Switchable – Tractor or Friction Feed
* 80 character per second.

RS232C (SERIAL) £285
Plus £6 Securicor delivery

- **JOY STICK FOR SPECTRUM** £25.95
- **ZX81 RAM PACK**

Add 16K memory to your ZX81. High quality, fully guaranteed .... ~~£31.50~~
Special Offer £24·95

data-cassette®

44 Shroton Street, London NW1
Telephone: 01-258 0409

Dept. US3 Data-Cassette, 44 Shroton Street, London NW1
PLEASE PRINT

Qty	Item	Item Price £	Total £

Please charge to my Access/Barclaycard/Trustcard account no.

Signature
Name: Mr/Mrs/Miss
Address

Northern Premier Exhibitions

proudly announce a

ZX fair

MARCH 26th PUDSEY CIVIC CENTRE, DAWSON CORNER, STANNINCLEY, NR. LEEDS. (BETWEEN LEEDS & BRADFORD)

* * * * * *

MAY 21st STARS DISCO, QUEENS ROAD, SHEFFIELD. (NEXT DOOR TO ICE RINK ½ MILE FROM CENTRE).

* * * * *

A BRAND NEW SPECTRUM TO BE WON. TICKETS 25p.

* * * * *

FOR TABLES CONTACT MIKE DONNACHIE
0532-552854 AFTER 4 p.m.
16 SOUTH PARADE, PUDSEY,
WEST YORKSHIRE.

* * * * *

Adminsion — ADULTS 75p, CHILDREN 50p.
10 a.m. till 5.00 p.m.

HARDWARE, SOFTWARE, BOOKS AND MAGAZINES — EVERYTHING FOR ZX USERS.
THIS FAIR IS EXCLUSIVELY FOR ZX COMPUTERS.

ZX81-16K/DRAGON 32/BBC A+B
SPECTRUM 16/48

ADVENTURE 200 (16k)

OVER 200 PLACES to explore. Written in machine code and using advanced data compression techniques it squeezes a true fixed-map adventure into just 16K – all held in ram – no extra cassette reads or books of text. Unlike a randomly generated maze type game this is a real test of your tactical skill. It starts easy but the further you progress the more dangerous and difficult the problems become as you use objects around you to overcome obstacles and evade enemies! More like a thriller than an arcade game – and you are the hero! Flexible command format allows abbreviations and multiple word lines.

Other games from Foilkade include:-

AWARI – Ancient African game of logic

FANTASTIC VOYAGE – (ZX81 16K only) Real-time simulation of micro-sub in human body. Real vascular map and fast m/code graphics.

THE FOILKADE CHALLENGE: Buy both Adventure and Awari and enter our prize competition. SAE for details.

All games £5.95 inc. 2 for £9.95 3 for £13.95

£1000 IN PRIZES

FOILKADE LTD

'PCW3', 66 LITTLEDEAN, YATE, BRISTOL BS17 4UQ

NOW. A ZX81 PUSH-BUTTON KEYBOARD FOR UNDER £10.



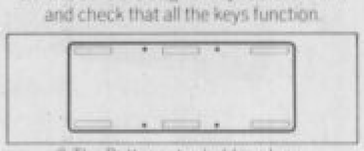
At last there's a really cheap but efficient way of ironing out the ZX81's only real bug: its keyboard. The Filesixty Buttonset offers

- A full-travel calculator-type moving keyboard for only £9.95.
- Installed in seconds. The peel-off adhesive backing means you just register into position and press.
- No messy labels, dismantling or soldering.
- 3 groups of colour keys to pick out shift, numerals and newline.
- Precision moulded in ABS to match your ZX81, with contrasting legends for maximum legibility.

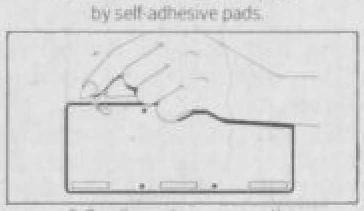
Allow up to 28 days for delivery.
Orders to Filesixty Ltd., FREEPOST, London W9 2BR.



1. Make sure the original keyboard is clean and check that all the keys function.



2. The Buttonset is held in place by self-adhesive pads.



3. So all you do is remove the protective backing.



4. And place it centrally on your ZX81.

Cheques/PO made payable to Filesixty Ltd.

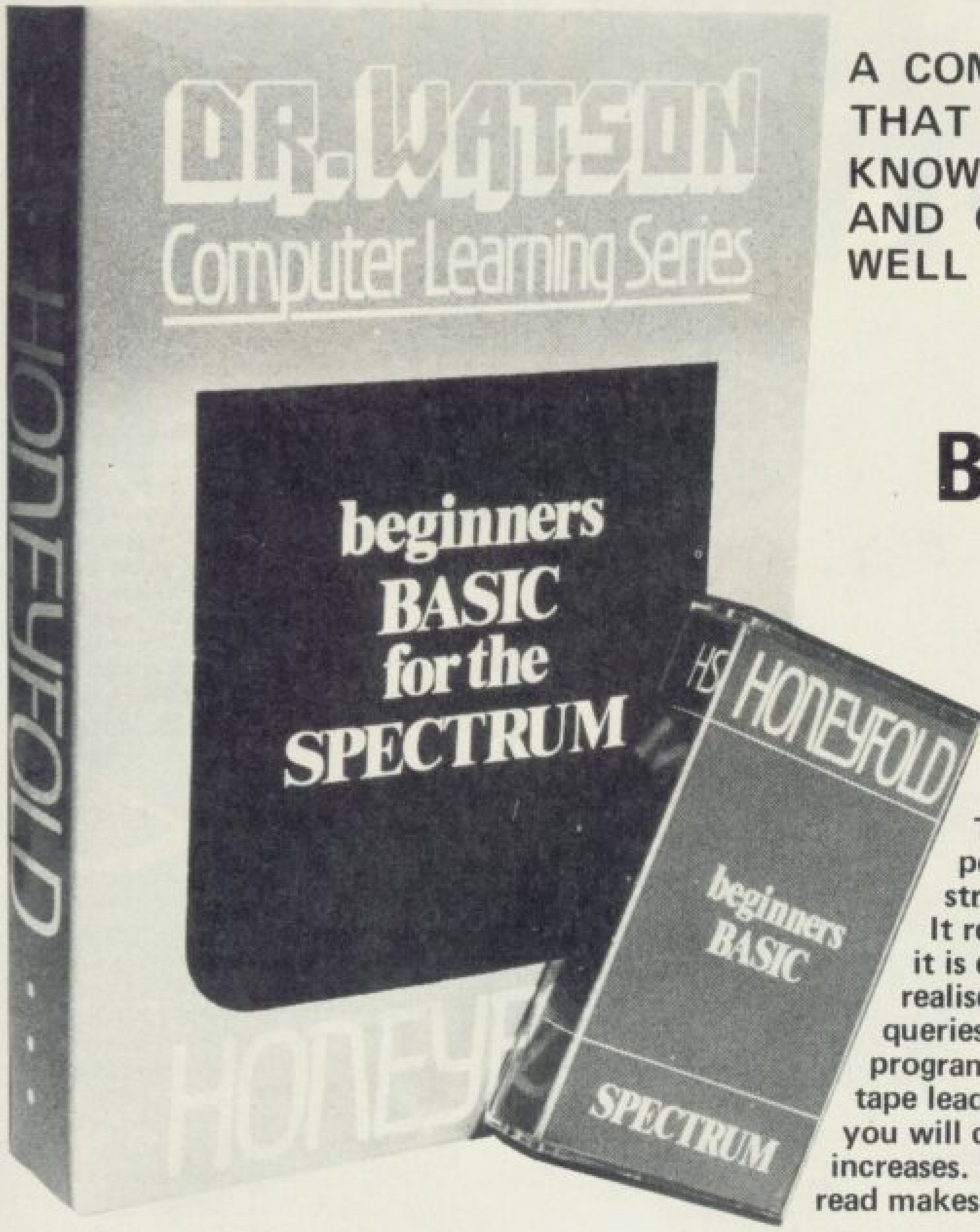
Please send me________(qty.) Buttonset(s) at £9.95 each (including VAT and P&P).

Total £ BLOCK CAPITALS

Name

Address SU5

FILESIXTY



A COMPLETE LEARNING COURSE THAT EXPECTS NO PRIOR KNOWLEDGE FROM YOU AND GIVES FRIENDLY BUT WELL STRUCTURED TUTORIAL

BOOK & TAPE

£14.95 inc. P & P

USA/CANADA/FAR EAST ADD £4.00

The whole Dr. Watson series is written by people who teach computing but specifically structured to be used by you at home. It remembers that home computing is for fun, it is easy to read and to follow but it also realises that you have no-one to answer your queries. All the teaching is integrated into the programs that you write and the whole book and tape leads you to your own adventure game which you will continue to expand as your knowledge increases. Using a tape of prepared programs as you read makes it more simple and much quicker.

The chapters are organised to let you start and stop at will. Those with some idea will quickly cover the first few chapters but will soon reach more difficult sections as the course progresses to your structured adventure game. The book covers:

CHAPTER ONE

PART ONE

The Spectrum Keyboard
Keys on the Top Row
The Main Keyboard

PART TWO

Getting Started in BASIC

PART THREE

A Brief Summary of Sinclair & Spectrum BASIC
Variables
Sting Variables
Other Functions
Screen Format
Cursors & Report Codes
High Resolution Graphics
User Defined Graphics
Sound
Conclusion

CHAPTER TWO

PART ONE

Guess the Number
Storing a Program
Load & Save
Comparing Numbers

PART TWO

BODMAS Tester

CHAPTER THREE

An Etcha-Sketcha
Numbers & Strings

CHAPTER FOUR

Putting Structure into your Program
Writing a Hangman Game
Initialisation
The Programs Structure

CHAPTER FIVE

Developing a Video Graphics Game
A Moving Ball
A Randomly-Moving Ball
A Bouncing Ball

CHAPTER SIX

Reaction Tester

CHAPTER SEVEN

Barcharts

CHAPTER EIGHT

PART ONE

Building on the Video Game
User-Defined Graphics
A Moveable Bat
Colour
Demolishing the Wall
A Final Program

PART TWO

Balltrap

PART THREE

Blockade

CHAPTER NINE

Composatune

CHAPTER TEN

Piecharts
Sample Problem
The Complete Pie Chart Program

CHAPTER ELEVEN

PART ONE

Adventure Game Project
The Adventure Database
Game Sequence Overview

PART TWO

Creating an Adventure
Loading the Database
Messages

PART THREE

Playing an Adventure
Debugging the Adventure
Extending & Improving the Adventure Interpreter

CHAPTER TWELVE

Sinclair BASIC's Advanced Features
Save
Verify
Load

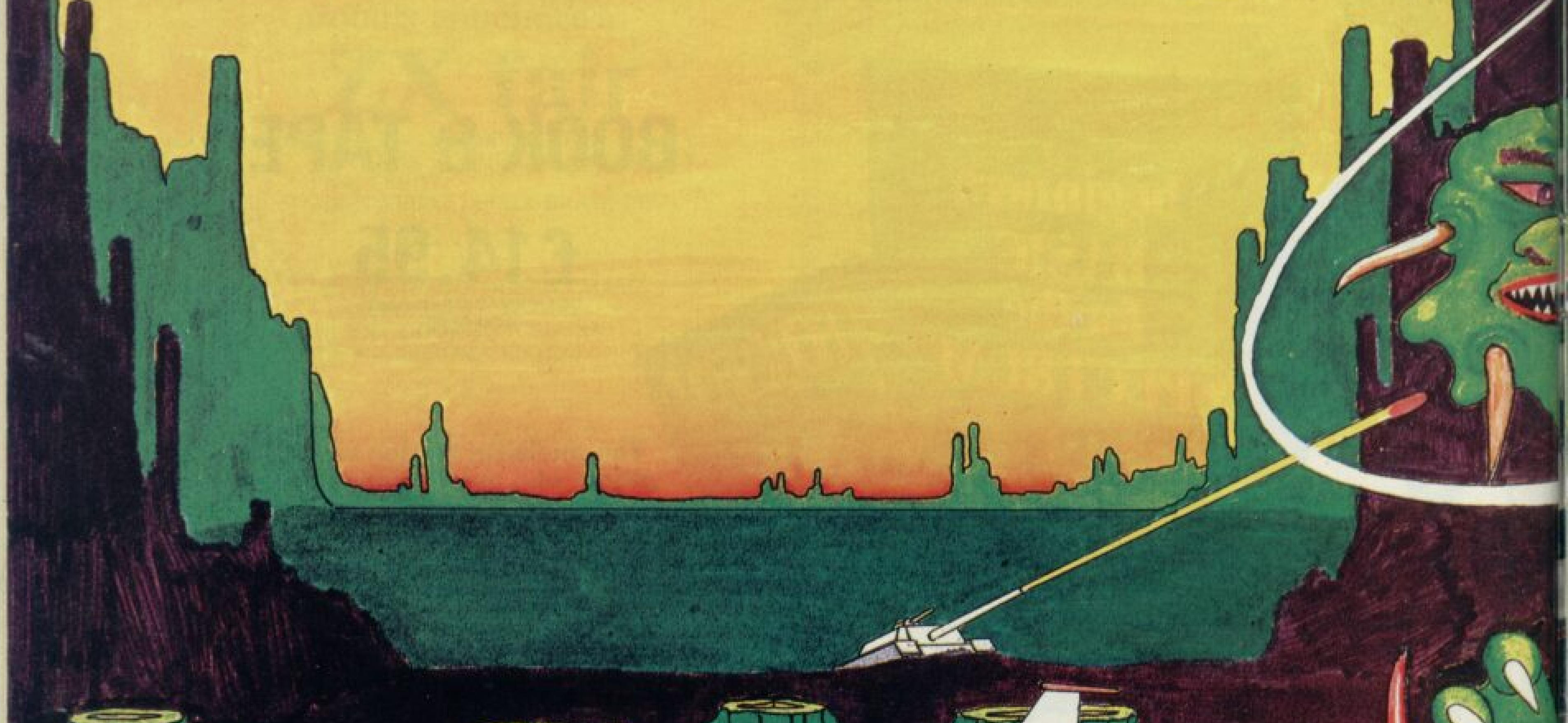
CHAPTER THIRTEEN

Solutions to Exercises

HONEYFOLD

**Honeyfold Software Limited
Standfast House, Bath Place,
High Street, Barnet, London.**

OUT OF THIS WORLD SOFTWARE...



PLEASE SEND ME .... @£	
PLEASE SEND ME .... @£	
PLEASE SEND ME .... @£	
PLEASE ADD ON 50p for P&P	
I enclose cheque/P.O. payable to	
DK Tronics total .... or debit my	
Access/Barclaycard	
NAME .... ADDRESS	
....	
SIGNATURE	

CREDIT CARD SALES LINE
(0493) 602453 (24 hrs)
Quoting your Access or Barclaycard number
DK Tronics software is also available from all good software outlets.

3D TANX—Pit your wits against the enemy Tanx. This is a full feature game with fantastic 3D balistics. **ONLY £4.95**
3D SPAWN OF EVIL—Eliminate the spawn before it matures to full attack potential. The most spectacular 3D space game ever written for this 16K Spectrum. **ONLY £4.95**
CENTIPEDE—Shoot down the ever menacing Centipede before it shoots you. One of the most addictive games for the Spectrum **ONLY £4.95**

For more information send S.A.E. for our full colour brochure.

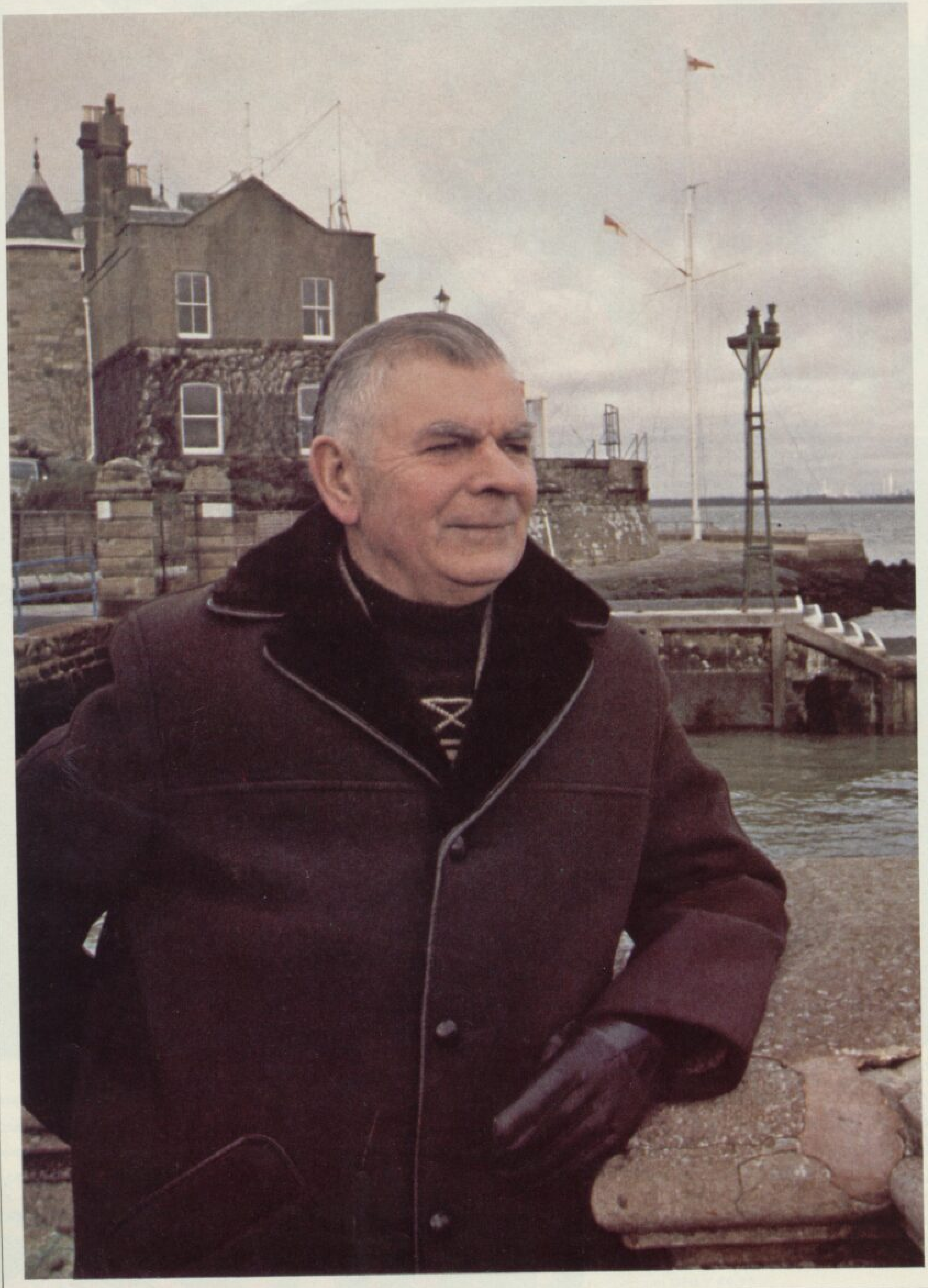


DICTATOR—Can you survive as Dictator? A complex and entertaining simulation adventure featuring easy operation and excellent use of graphics **ONLY £4.95**
METEOROIDS—The best Spectrum version of this popular arcade game **ONLY £4.95**
SOUND FX—Even the beginner can use this fanstastic program to create and infinitely variable amount of machine code sounds **ONLY £4.95**
DISASSEMBLER—A fast machine code disassembler for use on the 48K and 16K Spectrum giving full colour output to the screen **ONLY £4.95**
ZXED (Toolkit)—A powerful editor for use on the 16K and 48K Spectrum. It creates several useful and time saving features **ONLY £6.95**

...from dk'tronics

dk'tronics

23 Sussex Road, Gorleston, Gt. Yarmouth, Norfolk.



Each month we will interview a notable Sinclair user. Claudia Cooke meets our first User of the Month, a retired shipbuilding manager.

Retiring to the sea, the ships and his Sinclairs

ERIC ANSELL had been looking forward to retirement and the chance of a return to his native Isle of Wight. Two years ago, at the age of 65, he moved into a cottage near the sea at Cowes with his wife, also an islander, and intended to enjoy a quiet life of reading, walking and watching television.

"Never in a million years did I think I would learn something so new at my age", he says. Yet in the six months since his son gave him a ZX-81, he has become hooked on home computers, to the extent that he has just bought a Spectrum and a new tape recorder to go with it.

"My son bought a ZX-81 but then he moved to another computer and when he visited me last summer he asked if I would like the ZX-81.

"At first I wondered what I wanted with a computer. I could not see any use for it. I had no interest in computers and I did not realise how much fun they could be".

Ansell, however, is a man who believes in trying anything. "Once my son had left I started fiddling with it and became absolutely hooked in no time. It is the sheer logic of it which appeals to me," he says.

"You program a game from one of the books and it tells you that you have made two errors. Once you find those errors you realise they are so logical and obvious. It just takes common sense".

He admits it was two weeks before he managed to program a game successfully and he has not yet reached the stage of writing a program.

"When I bought the Spectrum two months ago, I found it much easier to start because I already had some knowledge of the ZX-81 and I have become much faster at typing-in now.

"I used to have two pipes of tobacco in the afternoon and perhaps read a little or watch television. Now I become so engrossed I forget all about my pipe and everything else and I usually spend about two hours, four days a week, with my Spectrum".

Ansell had had contact with computers during his work as naval planning manager with Swan Hunter in Newcastle before his retirement but although he did the critical path diagrams for the computer printouts, his contact was indirect.

"I was always rather dubious about large computers at work. If, for instance, something is proceeding satisfactorily on a ship and you put it through the computer to find the best way, you might have to wait five or six days for an answer but you can go and look at the ship and have it corrected in one day".

He spent 35 years working for a local shipbuilding firm at Cowes before moving to Newcastle when the firm closed. He began his career as a naval draughtsman and then became a chartered engineer before working as a naval shipbuilding manager. He loves ships and everything to do with them and says:

"What amazes me about the Spectrum is its ability to produce an almost perfect reproduction of, say, a destroyer, at the push of a few buttons".

> 'Never in a million years did I think I would learn something so new at my age'

Ansell is keen to scotch rumours that computers are for the young, or at least for the under-60s. He sees no reason why that should be so.

"I admit we are not so likely to have contact with them in retirement. I doubt that I should have discovered them if it had not been for my son but I would strongly advise any retired person with a reasonable amount of common sense to buy one straight away and play with it.

"It has given me an interest I never expected to have at my age and my brother-in-law and I spent the whole of Boxing Day together, playing golf with the Spectrum".

It must be said that he is and always has been an avid games player. Apart from being a crossword fanatic, he also subscribes to a weekly puzzle magazine and likes board games, too.

"I remember when my two sons were young, I would buy a new game every Christmas and we would all spend hours with it, sometimes making-up the rules as we went along which, of course you cannot do with a computer", he says.

As for progressing to even more ambitious activities, he is happy with his ZX-81 and his Spectrum, although he says he may consider a 48K Spectrum instead of his present 16K.

The next step, of course, is for him to begin writing programs, something he is characteristically keen to try.

"I realise I need more experience first and I am still enjoying the cassettes I can buy, like Escape and Othello, but I would like to program one or two games and I intend to try soon. I find a great sense of achievement in putting a program on tape and having it correct".

Ansell is a young-looking 67. He wears a smart blue velvet jacket and sits in an armchair within easy reach of a bowl of assorted pipes, as befits any ocean-loving man. On the other side is his Spectrum and across the room there is the presentation tray he received on his retirement from Swan Hunter, listing all the ships on which he worked.

The room is a stark mixture of the old and the new, a combination which Ansell has proved can work well together. All in all, computers have enhanced his life in a way he did not think possible and did not think he desired.

Retirement at Cowes, where he and his wife were brought up, attending the same school and marrying 43 years ago, is something of an idyll and Ansell admits that much as he enjoyed his years in Newcastle, there was never any doubt in his mind as to where he would set up his retirement home.

"I think that had I left the island when I was young, there might not have been the same nostalgia but I was 50 when we moved north and that is just too old to begin putting down new roots".

Now, surrounded by sea, ships and a host of books on both subjects, Ansell and his computers are enjoying themselves thoroughly.

IMPACT SOFTWEAR

From Scotland's Capital comes quality software for the

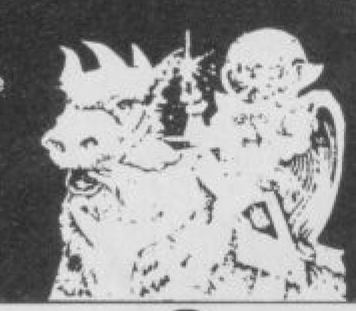
Destroyers 16 & 48K — **ZX Spectrum**

New and original arcade game in real time. Written in high speed machine code with hi-res graphics, full colour and sound effects. Test your skill against the awesome and varying firepower of the different waves of the Destroyers. High score saved. **£6.50**

ZX TREK
48K ZX Spectrum

First quality star trek game in real time with hi-res graphics plus constant on screen display of galaxy map, long range scan, and status report.
Over twenty commands with full colour and sound effects.
This game provides a real challenge for the ZX Spectrum game player.

£6.50



IMPACT SOFTWARE
70 REDFORD Ave
EDINBURGH
EH13 0BW
Tel 031 441 4257

DESTROYERS	£6.50
ZX TREK	£6.50

30 Hour BASIC (ZX81 edition)

Britain's top selling BASIC course

Over 100,000 users

- 8 chapters
- 155 programs
- 30 worked examples
- 53 self-checks *with* answers
- 35 exercises *with* answers
- 43 figures
- full index
- spiral bound — opens flat
- two colour text

You've got Britain's most popular computer.

Now get Britain's most popular programming course.

Amazing value at £5.95

Send for your copy/ies direct, enclosing payment, to:

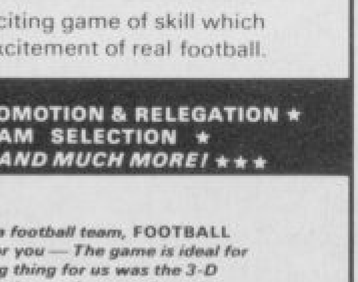
The National Extension College, 18 Brooklands Avenue, Cambridge CB2 2HN

NOW IN YOUR HIGH STREET SHOPS

FOOTBALL MANAGER

by Addictive Games

for **SPECTRUM 48K AND ZX81 16K**



This superb game is **now available** from branches of
W. H. SMITH and BOOTS THE CHEMIST.

Manage your own team in this exciting game of skill which vividly captures the drama and excitement of real football.

FEATURES INCLUDE:
★ 4 DIVISIONS ★ F.A. CUP ★ PROMOTION & RELEGATION ★ ★ TRANSFER MARKET ★ TEAM SELECTION ★ ★ SAVE GAME FACILITY ★★★ *AND MUCH MORE!* ★★★

WHAT THE PRESS SAY ABOUT IT:—

IF YOU have always wanted to manage a football team, FOOTBALL MANAGER, from Addictive Games, is for you — The game is ideal for a football fanatic but the most interesting thing for us was the 3-D graphics used to create the goalmouth action — the game is a winner.
SINCLAIR USER FEBRUARY 1983

Although I'm no great football fan, I really enjoyed playing this game — excellent use is made of colour and user-defined graphics. The game is very logically put together, so that the development of strategy and tactics has a real effect. For example, one of my teams got through to the fourth round of the F.A. Cup where it was beaten by a second division side. This upset morale and meant that our promotion bid failed. Perhaps I should have given up the F.A. Cup run and held some good players back — the possibilities are endless. Brian Clough had better watch out!
ZX COMPUTING FEB/MARCH 1983

ALSO AVAILABLE FROM THE FOLLOWING SHOPS:
BUFFER MICRO SHOP (London),
MICROWARE (Leicester),
ANIROG COMPUTERS (Horley, Surrey),
SUCCESS SERVICES (Walsall),
THE COMPUTER SHOP (Newcastle),
DRAGON BYTE (Leeds)
AND OTHER GOOD COMPUTER SHOPS

PRICES:
FOR THE SPECTRUM 48K £6.95, ZX81 16K £5.95
3D GRAPHICS ONLY IN SPECTRUM VERSION
To Order send Cheque/P.O. payable to:
ADDICTIVE GAMES, Dept. SU, P.O. Box 278, Conniburrow, Milton Keynes MK14 7NE
PLEASE STATE COMPUTER

A MUST FOR ANYONE INTERESTED IN ZX MACHINE CODE!



The finest range of utility programs for ZX Computers. Used by professionals. Very useful for beginners

ZX SPECTRUM MACHINE CODE SYSTEM (The key to machine code success)

SPECTRUM EDITOR/ASSEMBLER A powerful and essential machine code programming aid. 16K and 48K on same cassette + full documentation. Major features: EDITOR with Auto line number and renumber, 40 column screen display, tabulated into fields for easy reading; 5 character label names, easy line editing and cursor control; SAVE/LOAD/VERIFY routines, output to ZX PRINTER. TWO PASS ASSEMBLER accepts all Z80 mnemonics; decimal or hex numbers, simple arithmetic on operands; Assembler Directives — ORG, END, DEFB, DEFW, DEFS, DEFL, EQU, DEFM. **ONLY £8.50**

SPECTRUM MONITOR Machine Code Debug/Disassembler Enter, Run, Debug M/C programs. Compatible with BASIC. Breakpoints and Registers Display. Disassembler to screen or ZX PRINTER. 16K and 48K on one cassette + 30 page manual. **ONLY £7.50**

ZX81 UTILITIES (For everyone . . . beginner to professional)

ZX81 REMLOAD Machine Code Debug/Monitor Explore and master machine code. Compatible with BASIC. CREATE A REM line — any length. BREAKPOINTS & REGISTERS DISPLAY. Fully documented 30 page manual and cassette. **ONLY £6.95** 16K to 64K

ZX81 ZX-MC Machine Code Debug/Monitor The professional one! ENTER/RUN/DEBUG M/C programs. SAVE/LOAD/VERIFY at double speed. BREAKPOINTS & REGISTERS DISPLAY. Self-contained machine code — cannot be used with BASIC. 36 page manual and cassette. **ONLY £7.50** 4K to 64K

ZX81 SCREEN KIT 1 More screen power in your BASIC programs! BORDERS — any size anywhere on screen. SCROLL in 4 directions. CLEAR and REVERSE part of the screen. FLASHING CURSOR anywhere on screen — simulates INPUT. DATA FILES SAVE/LOAD BASIC variables — Double speed. 880 Bytes machine code for instant response. Becomes part of your BASIC program. **ONLY £5.70** 4K to 64K

SEND CHEQUE/P.O. FOR FAST MAIL ORDER!
S.A.E. for full details.
6 Corkscrew Hill, West Wickham, Kent BR4 9BB

*All prices include VAT & P&P.

PICTURESQUE

Spectrum Software available from: Buffer Micro Streatham, Microware Leicester. Educational suppliers: Griffin & George.



We meet the people who deal with your queries and complaints. A behind-the-scenes look at the Sinclair mailing house

The go-betweens

SINCLAIR RESEARCH computers are now in a class of their own in the home computer market, which the company has done most to create. Despite its policy of selling many of its products by mail order, however, few of its customers have had direct contact with the company.

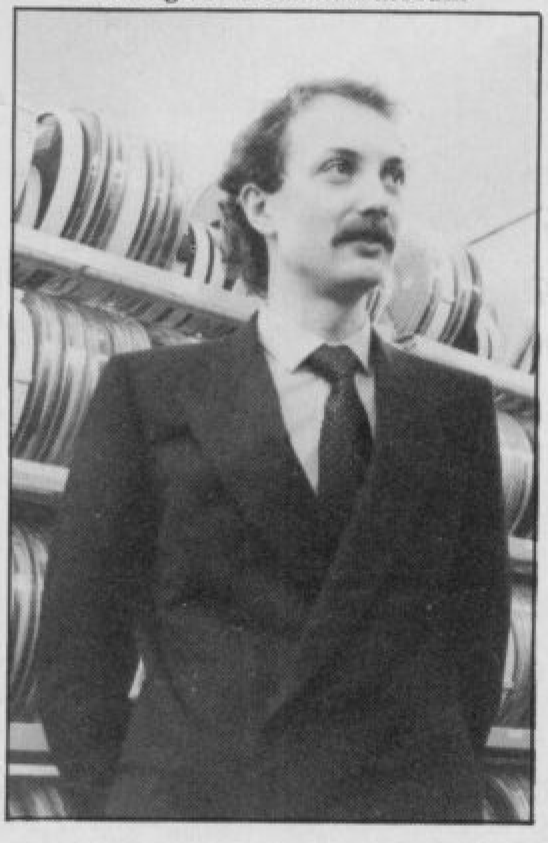
The reason is one of its other well-known policies — sub-contracting. As much as possible of the business of making and selling Sinclair products is delegated to outside companies, allowing Sinclair Research to have a very small staff, slightly more than 50 at the moment.

Most people who manage to obtain their machines and software without too much trouble find that the nearest they get to Sinclair Research is a company which works from small offices and a warehouse on a featureless industrial estate in the Surrey town of Camberley.

The offices are those of GSI U.K., the address and telephone number of which appear in Sinclair advertisements and to which the mail order coupons are sent. It is GSI which has the task of being the first line of complaint and query, answering the growing number of Sinclair users throughout the country. It is also the GSI switchboard which plays music to soothe the patient person waiting for a query to be answered.

GSI U.K. is the British subsidiary of a French company which has built a reputation as a supplier of marketing services to the motor trade. It maintains a mailing list for a large number of motor dealers which can be used when a particular group of people need to be contacted. GSI also looks after the despatch of the information.

NIGEL BROWN
In charge of the Sinclair account



With its associates, GSI claims to be the biggest computer bureau for the motor trade in Europe. Its ultimate parent is CIT-Alcatel, a division of CIT, the power generating company which is the private equivalent of Britain's Central Electricity Generating Board.

The expertise for large mailings with a certain amount of mail order distribution led to the company being considered when Sinclair was looking for a distributor.

"We had a good deal of experience with keeping names and addresses on file and mailing, so it was natural to start doing something like the Sinclair work," says Nigel Brown, product manager at GSI, who is in charge of the Sinclair account.

"We started working with Sinclair in October, 1980 when the ZX-80 was still being produced. Before that Sinclair had looked after the distribution and we needed only four people at that stage."

At that time the company was known as Jaserve, changing to GSI when it was taken over in April, 1981.

"With the launch of the ZX-81 in March, 1981 the work became much bigger, which was when I became the account manager, "Brown adds.

Now there are 58 people working exclusively on the Sinclair contract, which has grown to become a substantial

continued on page 52

continued from page 51

part of the British company's turnover.

Every one of the Sinclair products, the range of which now includes two computers — with different versions for the different television and power systems throughout the world — a printer, printer paper and a growing amount of software for all uses, passes through Camberley on its way to the corners of the world.

Each day two large, articulated container lorries make the long journey from Dundee to Surrey with the latest batch of Spectrums, ZX-81s and printers. Another slightly smaller lorry takes more products from the other Sinclair suppliers.

They all go into the large, highly-secure GSI warehouse but rarely stay for long. The items to be sent to distributors in export markets are sent to another warehouse, leaving GSI to deal with the distribution in Britain and those countries which have no agents.

Many items go almost immediately to the growing number of retailers now stocking the Spectrum and the ZX-81, while the rest go in batches of 50 to the mail order customers.

When the mail order system is running smoothly there is a clear number of stages in the processing of each order. Every morning the post is sorted into the queries and the orders, which are then further divided, depending on the goods required and the method of payment.

Cheques and cash are paid into a special holding account, where the money stays until the order has been satisfied; then it is transferred to the Sinclair sales account. Credit cards are not charged until the order has been fulfilled.

The orders are then entered on the computer and all the data stored on tape. When the goods are available to be sent, address labels are printed and another Spectrum or box of cassettes is ready for the post.

At the moment it is possible for GSI to say which stage a particular order has reached but not where it is within that stage. That resulted in many complaints during the Spectrum delay difficulties last year. Although an anxious customer could be told that their order had been received but was not about to be despatched, they could not find the place of their order in the queue. A new system is being installed which will allow the state of orders to be seen at a glance.

Brown adds that at the height of the problems it was difficult to be more specific, so that customers were not misled.

"We could give only general replies as the situation was always changing, so we thought it better not to give a specific answer which might then have to be altered," he says.

"Sinclair made a policy that everyone should be kept as informed about the position as possible and I think we were able to achieve that."

Most of the queries and complaints were by telephone, a customer service which has grown rapidly along with the rest of the Sinclair business. In October, 1980 there were only two lines. They have grown in stages, first to four, then eight, then 18, and last summer another 10 were added.

"In the early days on our two lines we were receiving about 100 calls a day. When the ZX-81 was launched that exploded to 1,000 a day. Now I think we probably have a capacity of about 2,000 a day," Brown says.

The calls deal with a vast number of subjects. Apart from complaints about non-delivery or faulty machines, many users need advice on particular aspects of using the machines. Some things, such as saving and loading difficulties, are the subjects of regular queries and there are almost 40 leaflets giving advice which can be sent.

For the more complicated queries there are three more technically-minded people available who attempt to find an answer.

Whatever the difficulty most of the callers are still polite. Even when the delays were at their worst last year, no-one became abusive when making complaints.

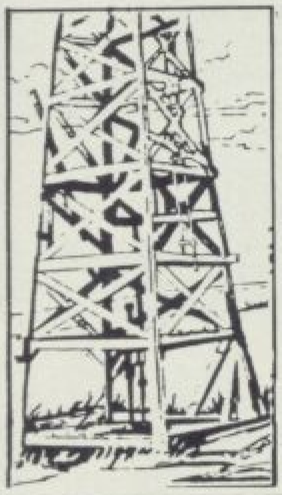
The GSI position as the public face of Sinclair Research will be reduced as the retail sales of Sinclair products increases. It is likely to remain the first place people will contact with their problems and complaints and will remain an important part of a string of companies involved in the production and selling of Britain's most popular computers.

The warehouse filled with Sinclair products ready for despatch



C.C.S. MANAGEMENT GAMES

16K ZX81 Spectrum



DALLAS

NEW!

A game of oil exploration and exploitation in Texas. Decisions are required on purchasing concessions, the movement and use of drilling rigs, and the building of platforms and pipelines. Can you take-over the Ewing Empire, or will you be taken-over in the attempt!

AUTOCHEF

As MD of a Catering Company you must negotiate for leases, decide on menu prices, level of wages, advertising and dividends. Each year you must predict the inflation rate. You will be made to resign if you are not successful. There are 3 levels of difficulty.

AIRLINE

Can you compete with British Airways? You must decide on the number of aircraft to operate, whether to buy or charter, and the levels of staffing and maintenance. Problems encountered are tax demands, strikes, cancelled flights, hijacks and aircraft crashes.

PRINT SHOP

You own a small printing company and are required to decide on (a) the number and type of staff you employ and when to increase or reduce staff (b) the amount and type of paper you stock (c) the week in which work is scheduled (d) the quotation for each. There are 3 scales of difficulty.



FINANCIAL MODEL — MODELLER X

This is a user friendly business modeller which provides Managers with a tool to plan the strategic decisions of a business. The model shows the profit sensitivity and the interaction of the pertinent marketing and production factors of a business. A user manual is included in the price of the program.

ALL PROGRAMS AVAILABLE FOR 16K ZX-81, SPECTRUM 16K AND 48K.

EXCELLENT ROYALTIES PAID FOR SINCLAIR SOFTWARE.

PRICES

ZX81 or SPECTRUM	16K	48K*
Dallas, Airline, Autochef, Print Shop	£5	£6
Modeller X	£8	£9

* Extended 48K Spectrum now available.

MAIL ORDER DISCOUNT £1.50 for two, £3 for three, £5 for four and £7 for the five.

TO ORDER

Please state computer type and send cheque to:-

DEPT.S., CASES COMPUTER SIMULATIONS
14 LANGTON WAY, LONDON SE3 7TL.

RETAIL STOCKISTS If you prefer to have a demonstration before buying, our stockists are as follows:

LONDON	Data-Assette, 44 Shroton Street, N.W.1.
	Buffer Micro Shop, 310 Streatham High Road, S.W.16.
BATH	Micro Style, 29 Belvedere, Lansdown Road.
BOURNEMOUTH	Zedxtra, 5 School Lane, Kinson.
BRIGHTON	Gamer, 25 Gloucester Road.
DAVENTRY	Micro Style, 67 High Street.
IPSWICH	Brainwave Micros Ltd., 24 Crown Street,
LEEDS	Dragon Byte, 51a Queen St, Morley.
LEICESTER	Microware, Unit 5, St Peters Lane.
MANCHESTER	Micro-Link, 830 Hyde Road.
	J.M. Computers, 136 Park Lane, Whitefield.
NEWBURY	Micro Style, 47 Cheap Street.
NEW ELTHAM	Kayde Home Computers, 1 Station Approach.
NORFOLK	Kayde Electronics Ltd., The Conge, Gt. Yarmouth.

Introducing - CP SOFTWARE SUPER CHESS II

For Sinclair 48K SPECTRUM

THE BEST at £7.95

CP SOFTWARE

Spectrum software

Specialists in high quality, intelligent games

Proof of the superiority of SUPERCHESS II is available in the form of listings of 10 consecutive games played against other well-known Spectrum Chess programs with the results SUPERCHESS II 8 wins, others 1 win, 1 win and 1 draw. The listings are free with each program or 40p on their own.

Guaranteed able to beat Sargon II and all other Spectrum chess programs!!!

- ★ **Seven levels of play**
- ★ **Plays a variety of openings e.g. French Defence, Sicilian Defence, Ruy Lopez, Queen's Gambit etc. ★ Self play mode ★ Analyse mode**
- ★ **Enhanced end-game play ★ Recommended move option**

Available only from the address below — dealer enquiries welcome

●● ORIGINAL SUPERCHESS ●● The Cheapest

10 levels of play: recommended move option: substantial 'opening book' e.g. French Defence, Queen's Gambit, Ruy Lopez etc: self play feature; analyse mode.

48K Spectrum — £4.95
16K ZX81 — £4.95

●● ZX DRAUGHTS ●●

The game for everyone, played at level 0 it replies immediately, can you beat it at level 9?

Draughts is an ideal game to apply tree searching techniques to. Our machine code program analyses each position in depth making it a formidable opponent. Choice of colour and search strategy. 10 levels of play, at level 4 (response time — 20 seconds) it beats its own programmer!

48K Spectrum — £6.95

●● BACKGAMMON ●●

Play this fascinating game of skill and chance.

High resolution colour display with dice roll. Uses machine code for fast response. Plays official rules so no cheating. Complete with instructions to enable beginners to learn the game.

48K Spectrum — £5.95

●● SPECTRUM SPEECH ●●

Yes it's possible! Software driven speech from the Spectrum. Simple to use in your own programs. Each cassette comes with user documentation and demonstration program. No extra hardware is required. Uses Spectrum speaker and top 32K Ram.

SOFTALK I: ''Multiwords' 70+ words, numbers zero to million, plus, go, limit, right, great etc . . . **48K Spectrum — £6.95**

SOFTALK II: 'Spacegames' 80+ words, numbers, red alert, torpedoes, phasers, bearing south etc . . . **48K Spectrum — £6.95**

SPECTRUM AMPLIFIER

Boost your Spectrum's speaker. This neat amplifier, with volume control, plugs directly into the Spectrum's EAR or MIC socket using the tape lead NO OTHER CONNECTIONS NECESSARY. Powered by a PP3 battery (not supplied), it doubles as a radio when not used with your Spectrum. **£5.95** or only **£4.95** when purchased with a SOFTALK program. Please add **35p** to cover p+p.

Visit us on stand S6 at the Midland Computer Fair, BIRMINGHAM, April 28th to 30th.

UK prices include post and packing. Despatch within 48 hours of receipt of order.

(For orders outside UK add 80p for postage)

Send cheque or postal order to:

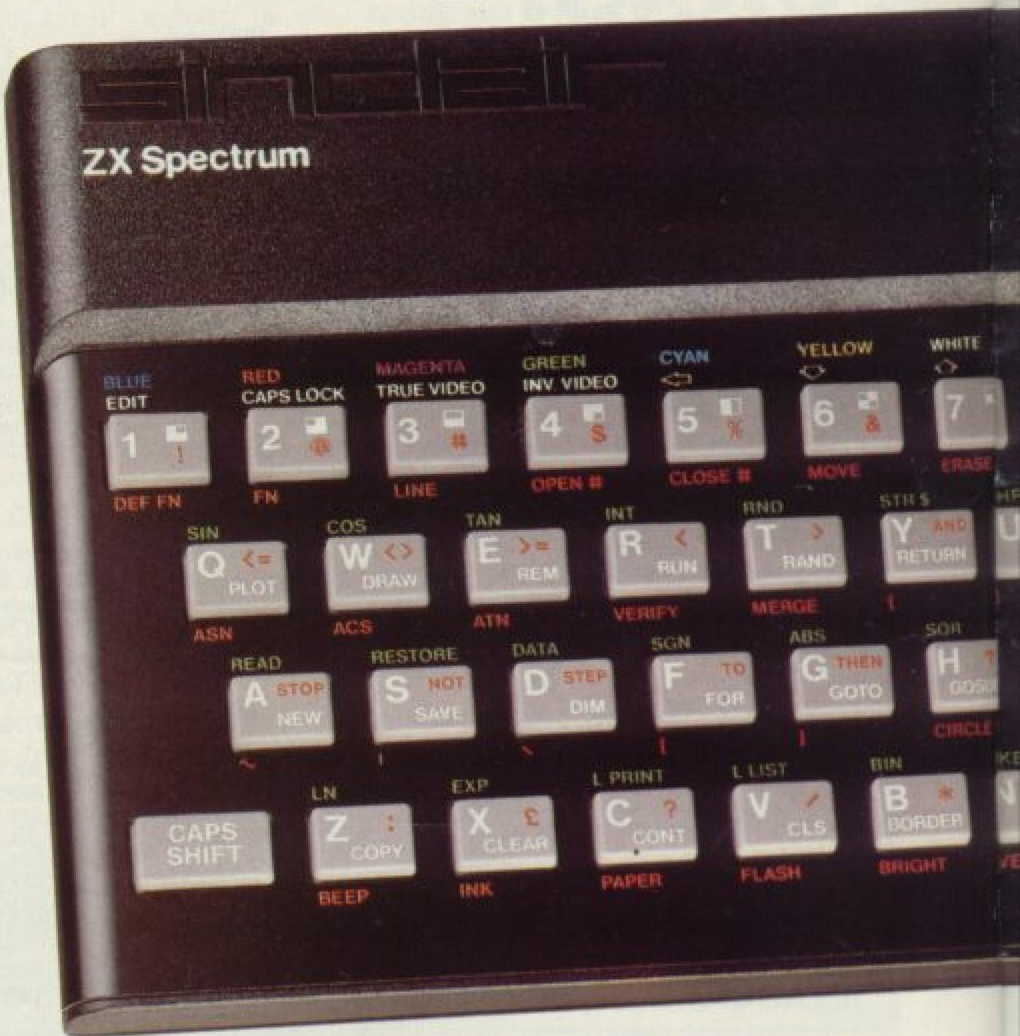
CP SOFTWARE, Dept. W17 Orchard Lane, Prestwood, Bucks. HP16 0NN

PROGRAMMERS — TOP RATES PAID FOR HIGH QUALITY SPECTRUM STRATEGY GAMES AND SPECTRUM FORTH.
SEND YOUR MATERIAL FOR EVALUATION AND PROMPT REPLY.

Sinclair ZX Spectr

16K or 48K RAM... full-size moving-key keyboard... colour and sound... high-resolution graphics...

From only £125!



First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together, they've sold over 500,000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

Professional power– personal computer price!

The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can uprate later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.

Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer – available now – is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232 / network interface board.



Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound – BEEP command with variable pitch and duration.
- Massive RAM – 16K or 48K.
- Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set – with upper- and lower-case characters.
- Teletext-compatible – user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE – 16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC – incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

rum

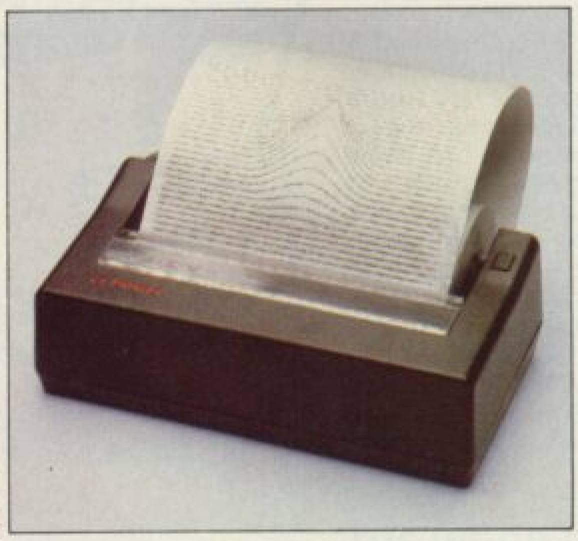


The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.



The ZX Microdrive – coming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing by providing mass on-line storage.

Each Microdrive can hold up to 100K bytes using a single interchangeable storage medium.

The transfer rate is 16K bytes per second, with an average access time of 3.5 seconds. And you'll be able to connect up to 8 Microdrives to your Spectrum via the ZX Expansion Module.

A remarkable breakthrough at a remarkable price. The Microdrives will be available in the early part of 1983 for around £50.



ZX Spectrum software on cassettes – available now

The Spectrum software library is growing every day. Subjects include games, education, and business/household management. Flight Simulation...Chess...Planetoids... History...Inventions...VU-CALC...VU-3D ...Club Record Controller...there is something for everyone. And they all make full use of the Spectrum's colour, sound, and graphics capabilities. You'll receive a detailed catalogue with your Spectrum.

ZX Expansion Module

This module incorporates the three functions of Microdrive controller, local area network, and RS232 interface. Connect it to your Spectrum and you can control up to eight Microdrives, communicate with other computers, and drive a wide range of printers.

The potential is enormous, and the module will be available in the early part of 1983 for around £30.

sinclair

Sinclair Research Ltd, Stanhope Road, Camberley, Surrey GU15 3PS. Tel: Camberley (0276) 685311.

How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Barclaycard, Access or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GUI5 3BR. **Order**

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum – 16K RAM version	100	125.00	
	Sinclair ZX Spectrum – 48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
	Printer paper (pack of 5 rolls)	16	11.95	
	Postage and packing: orders under £100	28	2.95	
	orders over £100	29	4.95	
			Total £	

Please tick if you require a VAT receipt ☐

*I enclose a cheque/postal order payable to Sinclair Research Ltd for £ ______

*Please charge to my Access/Barclaycard/Trustcard account no.

*Please delete/complete as applicable

Signature

PLEASE PRINT

Name: Mr/Mrs/Miss

Address

SUS 904

FREEPOST – no stamp needed. Prices apply to UK only. Export prices on application.

USE AND LEARN

"Excellent"
. . . ***Sinclair User.***

"Well-presented book . . . excellent music composer . . . useful routines . . . novel and interesting games. . ."

THE DATABASE

"Excellent"
. . . ***Sinclair User.***

"Simple to understand and will have users storing information in a matter of minutes. . ."

THE SPREADSHEET

"Excellent"
. . . ***Sinclair User.***

"Closely resembles Visicalc for the Apple but is less than one tenth of the price. . ."

"Can be used in business and the home. . ."

"Much clearer (than Vu-calc) . . ."

MiCROL

"Quality"
. . . ***Sinclair User.***

THE THOUGHT PROCESSOR

THE THOUGHT PROCESSOR

MiCROL©

SERIOUS SPECTRUM SOFTWARE only £9.95 each!

USE AND LEARN



Your perfect Spectrum starter Kit. 25 original BASIC programs you can use immediately, PLUS 118 page manual to help you get the most from your 16or48K Spectrum. 25 programs include: Music Composer, World Atlas, Computer Term Glossary, Screen Designer, Star Maps – PLUS games and powerful routines to use in your own programs: graph-drawing, text-editing, sorting, searching and much more. 118 page manual includes detailed description of programming techniques, full listings of all programs, and articles to develop your own program-writing skills.

"Excellent" A.R. West, Surrey. "First-time loading, user-friendly, superb documentation" J.E. Mann, Leeds.

THE DATABASE



Whether you want to update mailing lists, manage customer accounts, or simply produce an index of your record collection, THE DATABASE makes it easy and enjoyable. A breakthrough in power *and* practicality, THE DATABASE allows you to store information on any subject in the way *you* want, and gives you a full range of commands to display, update, sort, search and print – even perform calculations. Massive storage capacity: 1,000 lines in memory at a time, over 7,000 names and addresses on a single C90 cassette. See for yourself why THE DATABASE is the most advanced 48K Spectrum database available – far more powerful *and* practical than Sinclair's VU-FILE and all other "competitors".

THE SPREADSHEET



Based closely on Visicalc, the world's best-selling program, THE SPREADSHEET turns your 48K Spectrum into a "super-Calculator" that helps you solve all kinds of number-based problems quickly and easily. Hundreds of applications in business, engineering and science – and just as versatile for home finance management. Invaluable in education too, helping develop maths ability and confidence. In power, flexibility and ease of use, THE SPREADSHEET outperforms all other Spectrum spreadsheets – including Sinclair's VU-CALC. See for yourself, with the security of MiCROL'S 14 day money-back Guarantee.

THE WORD PROCESSOR



The only full feature, professionally-written word processor for 48K Spectrums. Use it to produce memos, letters, reports – THE WORD PROCESSOR has the features you need, including flexible editing, justification, centering, and automatic "word wrap". Simplicity itself to use, THE WORD PROCESSOR uses the same "what you see is what you get" principle as word processors costing hundreds of pounds more. 20,000 character storage capability for real-work applications, and it's easily adapted to work with full size printers. Once again, MiCROL sets the standard in serious Spectrum software.

To order: Simply complete the coupon, and FREEPOST with your cheque, made payable to MiCROL (UK Mail Order). All products normally available from stock and despatched by return. Credit Card Orders: By phone 9-5.30 Mon to Sat. stating name and address, Card No. and item(s) required.

MiCROL©

31 Burleigh Street, Cambridge CB1 1BR.

(0223)312453

Post to:– MiCROL (UK Mail Order) Freepost
31 Burleigh Street, Cambridge CB1 1BR

Please send me..............copy/copies of USE AND LEARN Vol. 1
Please send me..............copy/copies of THE DATABASE
Please send me..............copy/copies of THE SPREADSHEET
Please send me..............copy/copies of THE WORD PROCESSOR
I enclose cheque/P.O. for.............(£9.95 + 50p p+p – £10.45 total each)
Or I wish to pay by Access/Barclaycard/Visa
Card Number..
Please print name and address
Name..
Address..
....
....
Credit Card holder's signature.. SU4

BIGGER ★ BETTER

Buffer

MICRO SHOP

ZX81 · ZX SPECTRUM ·

DRAGON 32 · VIC-20 · BBC

The very best mail order items available "over the counter"

Games, Keyboards, Serious Programs, Rams, Books, Peripherals and much, much more!

FAST MAIL ORDER SERVICE PHONE **01-769 2887**
WITH ACCESS/VISA (24hr Ansafone)
or send large S.A.E. for catalogue (state which computer)

Open 10.30 — 5.30 Tues. to Sat. (closed Mondays)
310 STREATHAM HIGH ROAD, LONDON SW16

ALL-SORT™ S-1

ALL-SORT S-1 is a menu driven generator program for 48K Spectrum. It outputs to cassette lines of Basic for any Spectrum. Each output comprises an active line of call, RETURN and machine code, and a descriptive line.

The code sorts data in Basic arrays. It is relocatable, normally kept as a high numbered line. The sort is called by GO SUB.

Options include single or multi sort; preset or controlled by programmer or by program.

Four arrays may be sorted in parallel on four keys, all defined without restraint.

ALL-SORT code is fast. 1,000 records of 40 characters sorts in 13 seconds.

ALL-SORT S-1 includes a comprehensive manual. A demonstration is given on the cassette. Maintenance is by low cost replacement. A commercial user's licence is available.

No direct sale, get ALL-SORT S-1 from ZX software retailers.

ALAN FIRMINGER
171 Herne Hill SE 24

rrp £18 + vat
replacement £6

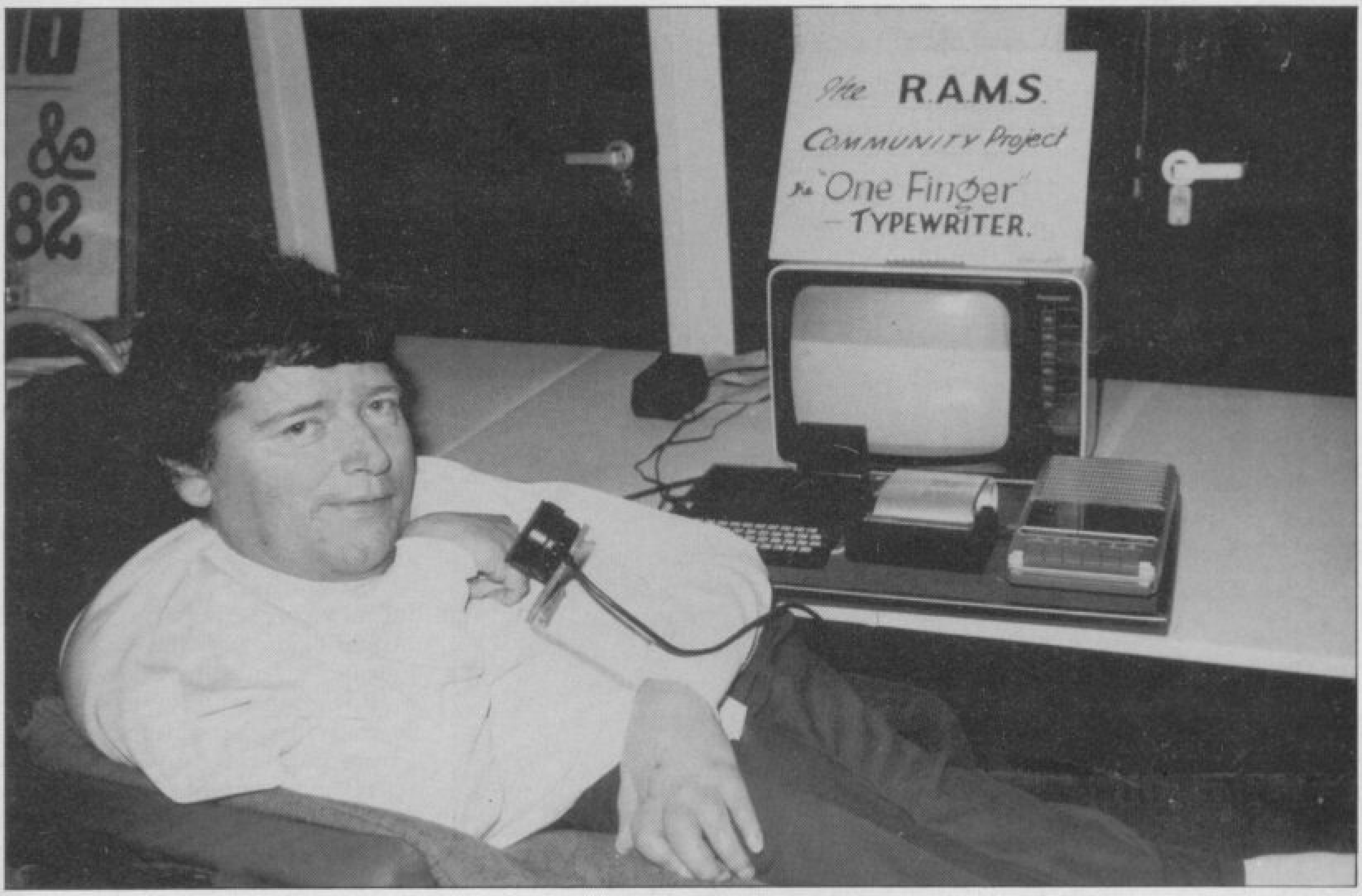


The affordable FORTH

		ZX81	
FORTH	: A full implementation of this very fast running language. Ideal for writing fast moving arcade type games. Allows the full colour and sound facilities of the Spectrum to be used. Future Microdrive enhancements will be made available. 48K Spectrum only.		19.95
Chess 1.4	: 10 Levels m/c. Graphic screen display. 16K ZX81 only.		8.95
Invaders	: Very fast m/c action. Includes mystery ship and increasingly difficult screens. 16K ZX81 only.		4.45
Mazeman	: A fast action m/c game that reproduces the spirit of the original. The Spectrum version includes excellent graphics and sound. 16K ZX81 & 16/48K Spectrum.	4.45	4.95
Adventure 1	: Based on the original game by Crowther, this game was the start of the Adventure craze. Reviewed Sinclair User.Iss.2. Features Save game routine as the game can literally take months to complete. 16K ZX81 & 48K Spectrum.	8.95	9.95

ABERSOFT

7 MAES AFALLEN, BOW ST, DYFED, SY24 5BA



A competition to see how micros could help the disabled resulted in an idea which was developed into the one-fingered typewriter

Club helps handicapped take advantage of ZX-81

AT A TIME when a competition was being run on the application of microcomputers to the problems of disability, a suggestion was made at Ashley House, a Shaftesbury Society home for the care of severely handicapped men at Bognor Regis, that a little black box used for chess could be doing something useful. How about making it work as an intelligent interface between someone's disability and something a person really wanted to do?

It seemed a good idea and was identified as an area which looked promising. A resident of 25 years, balanced and intelligent but permanently confined to a bed or a chair since the age of three, has a disability which means he can just about move one finger over a four-position microswitch touchplate by which he controls his electrically-propelled bedchair. The problem was that he wanted desperately to be able to write his own letters, and perhaps even his life story. So began the quest for the one-fingered typewriter.

There was sufficient respect for the ZX-81 to believe it was capable of doing the job but attempting to develop a program for it seemed difficult. After two attempts to obtain help the project was shelved for a time. Then at the Regis Amateur Micro Society when ideas were requested for a club community project it seemed like something those earnest enthusiasts could do.

Many club members contributed ideas and suggestions and Paul Chase, a bright young Bognorian, leapt at the chance and began to produce programs of ever-increasing application and sophistication. He had seen that if the problem could be solved it was applicable to any disabled person who could move a finger or a toe or an elbow or a head sufficiently to operate a four-position sensor that they would be able to type. It was a fascinating and exciting idea and the cost of the equipment was falling by the month.

He produced not only a one-fingered typewriter program but carried through to add a current-line edit faciity which resulted in virtually a one-fingered word processor.

The description of the one-fingered typewriter will necessarily be brief and incomplete, since new ideas are being conceived fast. Also there are many improvements which can be made when time and money are available.

The Mark 1 equipment consists conventionally of a TV set used as a monitor, a ZX-81 with 16K RAM, a Sinclair printer and a tape recorder. Additionally

continued on page 60



continued from page 59

there are five wires soldered inside the ZX-81 to provide the four control signals required. Those wires are connected via a plug and lead to a four-position micro-switch touchplate closely matching the device already used for chair control, but other control devices could be fitted for others with different disabilities.

The clever portion goes into the program. On loading, the first few lines appear automatically at the top of the screen as the text control system. It looks like this:

To explain, there is a central cursor in line three which can be moved left and right and up and down according to the four signals available from the touchplate. Line two contains the alphabet sorted into order of the most-used letter frequency, split left and right, and centred on an inverse for the space function between words.

That alphabetical arrangement appears a little strange at first sight but is remarkably economic in cursor movement and permits a rapid location of the required letters with a little practice.

Pushing the controller up when the cursor is under a desired letter or symbol causes the automatic transfer of that letter to its proper position next in the line of text, typewriter style, and pushing it up and holding it for a short time — adjustable — results also in the transfer of the additional letter, if any, from line one, which carries the second letter of the most-frequently-used letter combinations, TH, QU, and the like.

Pushing down the controller brings the cursor to operate on the lower line of characters wherein lie the punctuation marks, single character rubout (inverse R), the numerals, and the EDIT facility. In the EDIT mode a second cursor can be moved left, right, up and down through the text area to define the point of operation.

'There was sufficient respect for the ZX-81 to believe it was capable of doing the job but trying to develop a program seemed difficult'

The commands available are:

E enter edit mode.

D delete — you then enter the number of characters to be removed.

I insert letters words and spaces — insertions are first printed at the bottom of the screen for checking

T terminate — signals the end of the EDIT mode. Insertions are transferred to the defined point and any displaced text is re-arranged.

Thus by the use of only four signals not only can all the characters be chosen fairly rapidly but a degree of text modification can be achieved which would be impossible on a normal typewriter.

When the text area of the screen is full, printing follows automatically and the last two lines of text are reprinted at the top of the text area to aid continuity of thought. Printing of an only part-filled screen can be achieved by a cursor-selected COPY instruction — inverse C — and pre-programmed name and address facilities are available by selecting inverse N and inverse A respectively.

Inverse P provides automatic indentation of a line for a new paragraph. A later version of the program also includes 10 or so of the most popular small words, THE, IS, AND, selectable directly by cursor.

Obviously that is not the end of the story. Bright new ideas seem to arise at an average of one every 30 seconds and the difficulty will be reaching the stage of final definition, when there is still a good deal more which could be done. The best of all, though, is that there is a one-fingered typewriter which works.

Upper- and lower-case letters would be a great improvement and the Sinclair printer, remarkable though it is, is not really the instrument on which to frame important personal thoughts. Equally, the loading of a program from tape is something a disabled person could well do without, since it involves having to ask somebody else to do the loading.

Also a file of standard letters would be a useful facility. All those problems are easily soluble, at a price, but the remarkable thing about the project is how far it has moved on interest, goodwill and no budget; and its low-cost, value-for-money aspect is an important part of its virtues.

The Mark II one-fingered typewriter looks as if it should be based on a Spectrum for upper- and lower-case letters, the possibility of Microdrive loading, and potential connection to a more sophisticated printer. If possible, the program could be put into ROM instead of RAM and the loading chore eliminated entirely.

It would be impossible to acknowledge everybody who contributed to the synthesis of ideas which were worked into an operating program but without a club of enthusiasts it probably would not have happened.

SPECTRUM 48K | SPECTRUM 48K

VELNOR'S LAIR

THE MOST REALISTIC ADVENTURE YET

The Black Wizard Velnor has gone into hiding in the Goblin Labyrinth of Mt. Elk. The reason is now plainly clear, after centuries of searching he has finally discovered the ancient tomb of Grako and is now about to realise his ghastly ambition to become a true demon on earth! Time is too short to mass an Army aganist Velnor. There is only one hope for mankind. That one brave adventurer may be able to penetrate Velnor's defences, defeating his guards, avioding the traps and surprising Velnor before the metamorphosis is complete. You are that chosen person, but beware, not only does Velnor employ the most ghastly of creatures as guards, he is also a master of illusion.

In this D & D stye adventure you may be a Wizard, Warrior, or Priest, as a Warrior you are best suited to battle, but how will you cope with the fiendish spells of Velnor? As a Wizard your spells are devastating, but beware, your magic is limited and armed combat doesn't come easy! As a Priest you may protect yourself with the devine powers and you have no fear of the undead, but how will you handle the ghastly Trolls?

The adventure will require ingenuity and careful planning. Combat takes the form of D & D style scenarids where instant death is rare but, beware, wounds are cumulative and stratergy is of the utmost importance.

Only £6-50 inc. p+p

Cheques or P. O. to:

NEPTUNE COMPUTING (Dept. SU1)

98, Howe Street,

Gateshead, Tyne & Wear NE8 3PP

OSG OXFORD SOFTWARE GROUP

Educational, Domestic and Scientific Software

Personality Evaluation Test

This is not a game, but a scientific attempt to give an objective measure of your personality in relation to the population as a whole. You can also run the test to discover how you see the personalities of others and how they see you. Extensive use of graphs, bar-chart displays. Full documentation. £7.50 (16K Spectrum, 16K ZX81). £8.00 (extended version, 48K Spectrum only)

Personal Accounting Program

Frequently overpriced, this type of program is essential for those who either want, or need, to keep a day-to-day record of their finances and financial transactions without time-wasting recourse to bank-statements, cheque stubs, etc. Full documentation. £4.00 (16K Spectrum, 48K Spectrum, 16K ZX81)

Aurora Spectoralis

If you thought that you'd exhausted the graphics capabilities of your Spectrum, think again. This program is full of useful ideas and routines that you could be using in your own programs - use it as a party piece, or let it help you to write your own. £3.00 (16K Spectrum, 48K Spectrum)

Jumpin' Jack Splat

First cross the road to get your logs - use them to cross your river - but watch out for the crocodiles! £4.00 (16K Spectrum, 48K Spectrum)

If there's something you'd like your computer (ZX81, Spectrum, Jupiter Ace, T.I. 99/4) to do, but don't know how, or if, it can be done... if you have an idea for a program you'd like to write, but don't have the time, know-how, (or inclination!) to do yourself... write to us, giving brief details. If we think we can help you, we will send you a request for further information (if necessary), and an estimate (exact terms negotiable) of cost. Please include your telephone number when writing.

Oxford Software Group, Lady Margaret Hall, Oxford OX2 6QA

PROGRAM POWER MICRO POWER PROGRAM POWER

THE NEW SPECTRUM 'ADD-ON'

NOW WITH ADDITIONAL SWITCH-TYPE JOYSTICK PORT

BLADAMM!

ONLY £22·50 PLUS VAT

COMPLETE your SPECTRUM with our Multi-purpose Sound Generator and Joystick-port Board!! With one low-cost purchase you can obtain the following outstanding improvements to your ZX SPECTRUM:

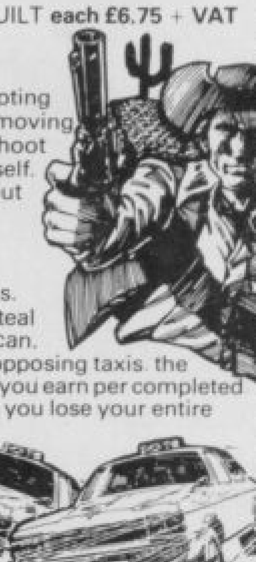
- THREE CHANNEL sound effects. PROGRAM three independent sounds with music, gun shots, explosions etc.
- AMPLIFICATION of the standard sound output.
- TWO ports for Potentiometer Joysticks;
- ONE port for Switch-type Joystick.

The 'ADD-ON' uses the amazing AY-3-8910 SOUND Chip, which gives you an enormous range of sound effects. The output and volume of each channel can be separately controlled, with gun shots, explosions, drums etc., produced under the 'sound envelope'. MOST IMPORTANT TO NOTE — the CHIP is 'processor independent.' This means that sounds can continue to be produced without any noticeable effect on the speed of your program!! The 'ADD-ON' contains its own speaker and amplifier chip and is supplied with a cassette containing sound demonstration routines and some sample sounds. The 'ADD-ON' simply plugs straight onto the back of your SPECTRUM. No soldering is required.

COMPLETE YOUR SPECTRUM NOW!!

JOYSTICKS (POTENTIOMETER-TYPE)
KIT (incl. case) **each £5.35 + VAT** BUILT **each £6.75 + VAT**

NEW **COWBOY SHOOT-OUT**
(Machine Code) **£3.95 + VAT**
Full feature, TWO PLAYER, cowboy shooting game. Hide behind the cactus plants and moving chuck wagons until they are shot away. Shoot your opponent and avoid getting hit yourself. The second player can be the computer, but you set its skill from 10 levels. Excellent colour graphics and sound.



CABMAN (Machine Code) **£3.95 + VAT**
You are the owner of a fleet of yellow taxis. A rival firm competes with you, trying to steal your fares and run you off the road, if they can. Ten skill levels determine the number of opposing taxis, the speed at which they drive and the amount you earn per completed journey. MAXIMISE your earnings before you lose your entire fleet. This program is FIRST CLASS.



MACHINE CODE PROGRAMMERS — ACS SOFTWARE
ASSEMBLER .... **NOW ONLY £5.95 + VAT**
DISASSEMBLER .... **NOW ONLY £4.95 + VAT**

BBC, DRAGON & ACORN DEALERS

BOOKS
LARGE RANGE FOR SPECTRUM AND ZX81

VISA

NOTE: We stock (and market) PROGRAM POWER SOFTWARE for the BBC, ACORN, SPECTRUM and DRAGON 32. Send S.A.E. for appropriate catalogue.

MICRO POWER

All programs are now available at all good dealers or direct from MICROPOWER LTD.

Dept. SU4
8/8a REGENT STREET,
CHAPEL ALLERTON,
LEEDS LS7 4PE.
Tel. (0532) 683186 or 696343

Please add 55p order P & P + VAT at 15%

WRITTEN ANY PROGRAMS! WE PAY 20% ROYALTIES FOR DRAGON, SPECTRUM BBC PROGRAMS

Make Friday you



★ **Personal Computer News** is weekly, published every Friday.

★ **Personal Computer News** is only 35p.

Around a hundred pages printed on glossy paper, much of it in full colour.

Probably the best value to be found on your newsagents shelves.

★ **Personal Computer News** is edited by the largest editorial team working on any microcomputer publication in Britain. We have individual editors working on hardware, software, peripherals, features, listings and programs – fourteen of them in all.

A massive investment of talent and expertise with only one aim. To make **PCN** the finest microcomputing title in Europe.

★ Our deadlines on news and features are short.

That means we get to publish comprehensive hardware tests, software reviews, news and much else besides, weeks and weeks before monthly titles

r day of discovery.



can hope to do so.

Personal Computer News is carrying scoop reviews and tests in virtually every issue.

Whatever your particular interest in the world of microcomputing, you'll find it first in **PCN.**

★ **Personal Computer News** comes from the publishers of **Personal Computer World.**

That means you can rest assured on the quality and independence of the editorial package.

★ Every issue of **Personal Computer News** carries a pull out 'part-work' which will gradually build into a comprehensive library on microcomputing.

In addition, you'll find free Readers' Buy and Sell ads, a totally unique programs listing section for the more popular micros, Buyers' Guides, language articles and much, much more.

★ Make Friday your day of discovery. Try **Personal Computer News.** The Complete Computing Weekly.



ZX 81 Arcade Action List

ZX 81 Compiler	☐	£5.95
Muncher (ZX 81)	☐	£4.95
Asteroids	☐	£4.95
Invaders	☐	£3.95
Alien-dropout	☐	£3.95
Startrek	☐	£3.95
Graphic Golf	☐	£3.95
Super Wumpus	☐	£3.95
Games Pack 1	☐	£3.95

ZX – Spectrum Software

Orbiter	☐	£5.95
Ground Attack	☐	£5.95
Starship Enterprise	☐	£5.95
Muncher	☐	£5.95

GENEROUS DEALER DISCOUNTS AVAILABLE

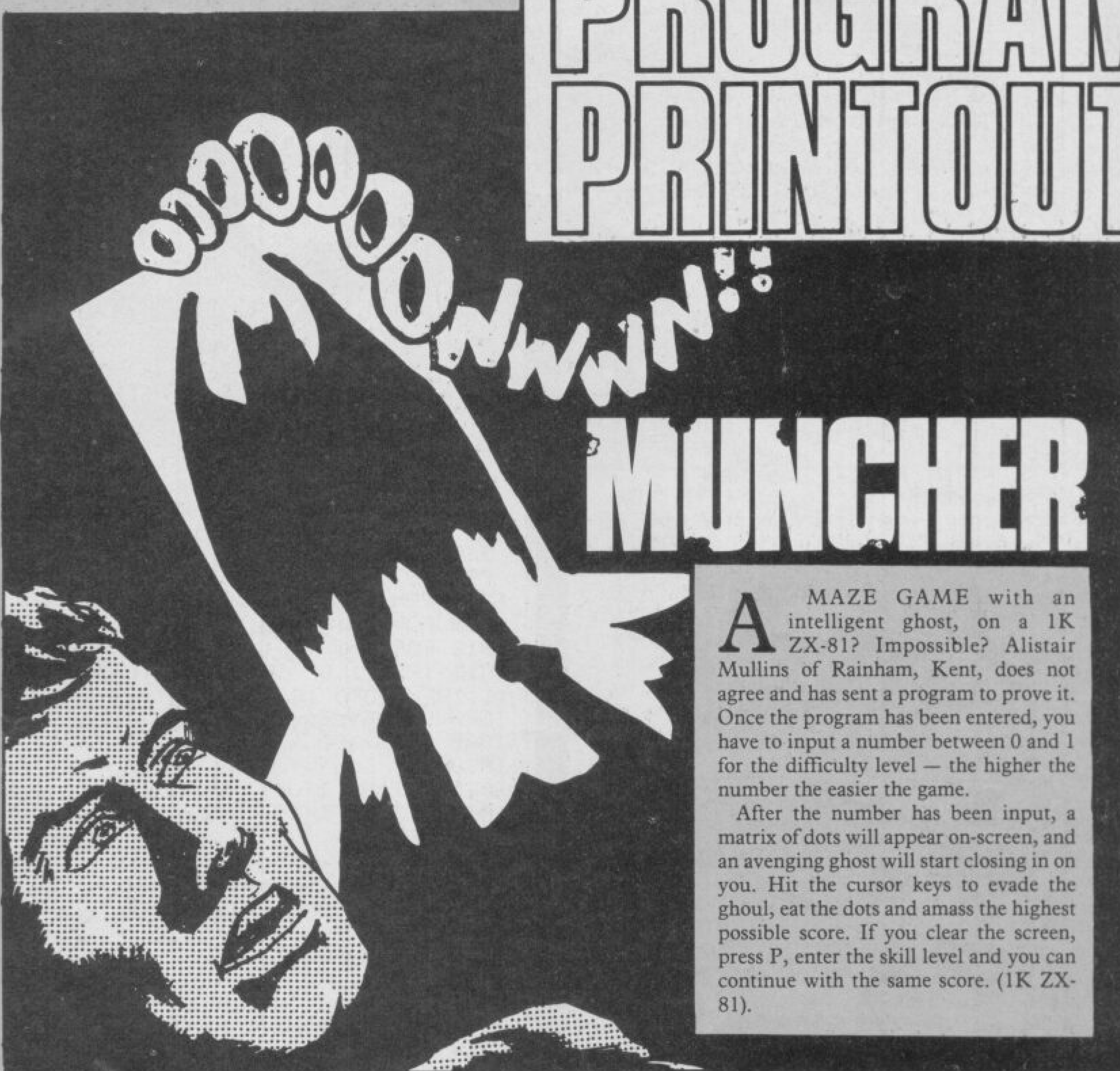
SILVERSOFT LTD.
2 Hammersmith Broadway
London W6

Please send me as indicated. I enclose a cheque/PO for £______

NAME______ ADDRESS ______

PROGRAMMERS. Tired of working for nothing, send your programs to SILVERSOFT for a speedy reply.

PROGRAM PRINTOUT



MUNCHER

A MAZE GAME with an intelligent ghost, on a 1K ZX-81? Impossible? Alistair Mullins of Rainham, Kent, does not agree and has sent a program to prove it. Once the program has been entered, you have to input a number between 0 and 1 for the difficulty level — the higher the number the easier the game.

After the number has been input, a matrix of dots will appear on-screen, and an avenging ghost will start closing in on you. Hit the cursor keys to evade the ghoul, eat the dots and amass the highest possible score. If you clear the screen, press P, enter the skill level and you can continue with the same score. (1K ZX-81).

```
  10 LET S=0
  14 CLS
  15 INPUT A
  20 LET Q=1
  30 LET W=1
  40 LET R=INT (RND*7)+1
  50 LET E=INT (RND*7)+1
  60 FOR F=1 TO 10
 110 PRINT "(ten inverse full st
oPs)"
 120 NEXT F
 130 IF INKEY$="P" THEN GOTO 14
 190 PRINT AT Q,W;"(inverse <)"
 200 IF PEEK (PEEK 16398+256*PEE
K 16399)=155 THEN GOSUB 1000
 300 LET Q=Q+(INKEY$="6" AND Q<8
)-(INKEY$="7" AND Q>1)
 310 LET W=W+(INKEY$="8" AND W<8
)-(INKEY$="5" AND W>1)
 314 IF Q=R AND W=E THEN GOTO 70
00
 315 IF RND<A THEN GOTO 130
 320 PRINT AT R,E;CHR$ 11
 322 IF PEEK (PEEK 16398+256*PEE
K 16399)-128 OR 155 THEN PRINT A
T R,E;"(inverse SPACE)"
 330 LET R=R+(Q>R)-(Q<R)
 340 LET E=E+(W>E)-(W<E)
 900 GOTO 130
1100 LET S=S+1
1150 PRINT AT Q,W;"(inverse SPAC
E)"
1200 RETURN
7000 PRINT S
```

HARE




```
   2 GOSUB 8000
   4 CLS
   5 FAST
   6 DIM B$(12,12)
   7 GOSUB 1800
   8 LET BB=0
   9 LET R=0
  12 FOR L=38 TO 64
  20 LET J$="(graphic H;IS;graph
ic H;IS;graphic H;IS;graphic H;I
S)"
  21 LET M$="(IS;graphic H;IS;gr
aphic H;IS;graphic H;IS;graphic
H)"
  22 FOR I=1 TO 8
  23 PRINT AT 2,I+2;I;
  24 NEXT I
  27 FOR T=1 TO 4
  30 PRINT AT 1+(2*T),3;J$
  31 PRINT AT 2+(2*T),3;M$
  32 NEXT T
  33 LET A=37
  40 FOR I=1 TO 8
  50 LET A=A+1
  60 PRINT AT I+2,11;CHR$ A
  70 NEXT I
  75 REM **PRINT STARTING POS.**
  90 FOR I=1 TO NU
 100 PRINT AT 10,(I*2)+1;"d";
 102 LET B$(10,(I*2)+1)="d"
 110 NEXT I
 113 LET X=INT (RND*4)*2+3
 120 PRINT AT 4,X;"h"
 121 LET B$(4,X)="h"
 122 LET HX=X
 123 LET HY=4
 200 SLOW
 205 LET R$=" "
 207 REM **INPUT AND ANALYISE MO
VE"
 210 PRINT AT 17,0;"INPUT MOVE"
 220 INPUT A$
 230 IF LEN A$>=3 OR LEN A$<=1 T
HEN GOTO 310
 240 INPUT Q$
 250 IF LEN Q$>=3 OR LEN Q$<=1 T
HEN GOTO 310
 256 LET P=CODE A$(1 TO 1)-35
 257 LET I=CODE A$(2 TO 2)-26
 258 LET W=CODE Q$(1 TO 1)-35
 259 LET E=CODE Q$(2 TO 2)-26
 260 IF P<>W+1 OR I<>E+1 AND I<>
E-1 THEN GOTO 310
 265 IF W<3 OR W>10 OR E<3 OR E>
10 THEN GOTO 310
 266 REM **PRINTING MOVE**
 267 IF B$(P,I)<>"d" THEN GOTO 3
10
 280 PRINT AT W,E;"d"
 285 LET B$(W,E)="d"
 293 IF I>10 OR P>10 THEN GOTO 3
10
 295 PRINT AT P,I;"(IS)"
 297 LET B$(P,I)="(IS)"
 298 LET BB=BB+1
 299 GOSUB 2400
 300 IF R$<>" " THEN GOTO 4000
 305 GOTO 200
 309 REM **INCORRECT MOVE**
 310 PRINT AT 0,15;"INCORRECT MO
VE"
 315 PAUSE 90
 316 PRINT AT 0,15;"
  "
 320 GOTO 200
 790 GOTO 1800
1799 REM **SETTING UP MATRIX**
1805 FOR I=1 TO 11 STEP 2
1810 FOR J=1 TO 11 STEP 2
1815 IF I=1 OR I=11 OR J=1 OR J=
11 THEN GOTO 1830
1820 LET G$="(IS)"
1825 GOTO 1835
1830 LET G$="e"
1835 LET B$(I,J+1)=G$
1840 LET B$(I+1,J)=G$
1845 NEXT J
1850 NEXT I
1855 RETURN
2409 REM **SOME STRATEGY**
2418 FAST
2420 GOSUB 5000
2450 SLOW
2526 IF REC=0 THEN RETURN
2543 REM **PRINT COMPUTERS MOVE*
2544 LET B$(HY,HX)="(IS)"
2545 PRINT AT HY,HX;"(IS)"
2550 LET HY=NHY
2551 LET HX=NHX
2555 LET B$(HY,HX)="h"
2556 PRINT AT HY,HX;"h"
2591 RETURN
3999 REM **FINISH OFF GAME**
4000 PRINT AT 16,0;"YOU HAD ";BB
;" GOES"
4001 PRINT AT 17,0;R$;".ANOTHER
GAME?"
4010 INPUT I$
4015 IF I$="Y" OR I$="YES" THEN
RUN
4020 PRINT AT 21,0;"THANKS FOR T
HE SESSION"
4030 STOP
5040 REM **GET TOTAL X COORDS OF
 DOGS**
5045 LET C=0
5050 FOR I=3 TO 10
```



JAMES and Richard Beatty of Old Windsor, Berkshire, have sent an excellent listing of a game new to us, called **Hare and Hounds**. Your ZX-81 plays the hare and you and your four hounds have the task of trying to block its progress to the bottom of the chess-style playing board.

The computer-controlled hare can move in any direction; your hounds can go only forwards and the whole menagerie must stick to the black squares. The computer shows surprising cunning, even having the ability to claim victory or concede defeat before the game has been played-out completely. It also boasts of being unbeatable if you restrict yourself to three hounds; in our experience that may be correct.

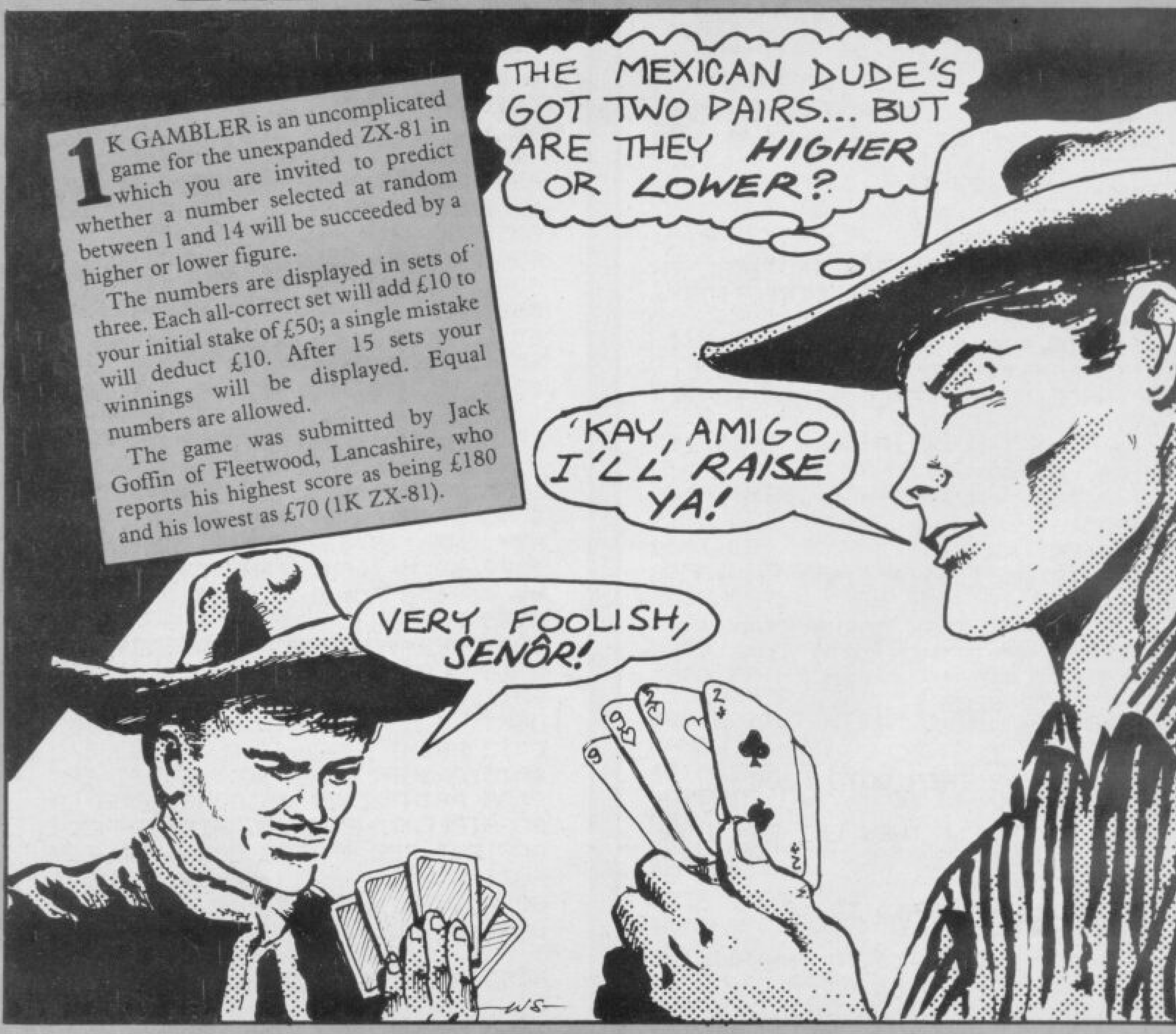
Enter your hound's present position as "Letter, Number, NEWLINE", and then its projected position one square on, in the same fashion; the computer will check for invalid moves. (16K ZX-81).

```
5060 FOR J=3 TO 10
5070 IF B$(I,J)="d" THEN LET C=C
+J
5080 NEXT J
5085 NEXT I
5450 REM **CHOOSE PREFERED X COO
RD OF DESTINATION TO OUTFLANK DO
GS**
5480 LET PC=-1
5481 LET PD=1
5485 IF C/NU>6.5 THEN GOTO 5500
5487 IF C/NU=6.5 AND RND>.5 THEN
 GOTO 5500
5490 LET PC=1
5491 LET PD=-1
6100 LET REC=0
6102 REM **CHECK FOR TACTICAL TH
RUST IN NON PREFERED DIRECTION**
6105 GOSUB 6300
6110 IF REC=1 THEN GOTO 6200
6115 REM **1-MOVE LOOK-AHEAD.(1)
ADVANCE.(2)PREFERED DIRECTION**
6120 FOR K=1 TO 2
6130 FOR I=HY+1 TO HY-1 STEP -2
6135 LET NHY=I
6140 FOR J=HX+PC TO HX+PD STEP (
2*PD)
6145 LET NHX=J
6150 IF B$(I,J)<>"(IS)" THEN GOT
O 6170
6155 IF K=1 THEN GOSUB 6500
6160 IF WF=1 THEN GOTO 6170
6163 LET REC=1
6165 GOTO 6200
6170 NEXT J
6175 NEXT I
6180 IF K=2 THEN GOTO 6200
6185 NEXT K
6205 IF REC<>1 THEN LET R$="I RE
SIGN,YOU WIN."
6219 LET K=0
6220 FOR I=(NHY+1) TO 10
6223 LET K=K+1
6225 FOR J=(NHX-K) TO (NHX+K) ST
EP 2
6230 IF J<3 OR J>10 THEN GOTO 62
60
6235 IF B$(I,J)="d" THEN RETURN
6260 NEXT J
6265 IF I=10 THEN GOTO 6280
6270 NEXT I
6280 LET R$="I CLAIM A WIN"
6281 RETURN
6300 REM **FORWARD THRUST?**
6305 IF B$(HY+1,HX+PD)="(IS)" AN
D B$(HY+2,HX+(2*PD))="(IS)" AND
(B$(HY+1,HX+PC)<>"(IS)" OR B$(HY
+2,HX+(2*PC))<>"(IS)") THEN GOTO
 6350
6345 RETURN
6350 LET NHY=HY+1
6355 LET NHX=HX+PD
6360 LET REC=1
6365 RETURN
6500 REM **DANGER?**
6510 LET WF=0
6515 REM **BOXED IN**
6520 IF B$(I+1,J+1)="(IS)" OR B$
(I+1,J-1)="(IS)" OR B$(I-1,J+1)=
"(IS)" OR B$(I-1,J-1)="(IS)" THE
N RETURN
6540 REM **AND A DOG WILL KILL**
6550 IF B$(HY+1,HX+1)="d" OR B$(
HY+1,HX-1)="d" THEN LET WF=1
6570 IF K=1 AND I>HY THEN LET WF
=1
6575 RETURN
8009 REM **HOW MANY DOGS?**
8010 CLS
8011 PRINT "DO YOU WANT 3 OR 4 D
OGS"
8012 PRINT
8013 PRINT
8020 PRINT "(IT IS CONSIDERED IM
POSSIBLE TO BEAT ME WITH THREE D
OGS,BUT SEE IF YOU CAN FIND A SO
LUTION"
8030 INPUT NU
8040 IF NU=3 OR NU=4 THEN RETURN

8050 PRINT "INPUT A VALID ANSWER
."
8060 GOTO 8030
```

```
  1 LET F=50
 10 FOR S=1 TO 15
 15 CLS
 20 PRINT AT 1,1;"£";F,S
 30 LET A=INT (RND*14)+1
 40 PRINT AT 10,10;A
 50 LET C=INT (RND*14)+1
 60 INPUT B$
 70 IF B$="L" THEN PRINT AT 10,13;C
 80 IF B$="H" THEN PRINT AT 10,13;C
 90 IF B$="L" AND C>A THEN GOTO 230
100 IF B$="H" AND C<A THEN GOTO 230
110 LET D=INT (RND*14)+1
120 INPUT C$
130 IF C$="L" THEN PRINT AT 10,16;D
140 IF C$="H" THEN PRINT AT 10,16;D
150 IF C$="L" AND D>C THEN GOTO 230
160 IF C$="H" AND D<C THEN GOTO 230
170 LET F=F+10
175 PRINT "WIN"
180 PAUSE 100
200 NEXT S
210 GOTO 270
230 LET F=F-10
235 PRINT "LOSE"
240 PAUSE 50
260 NEXT S
270 CLS
290 PRINT " YOUR FINISH=£";F
300 IF F<50 THEN PRINT "YOU HAVE LOST £";50-F
310 IF F>=50 THEN PRINT "YOU HAVE WON £";F-50
```

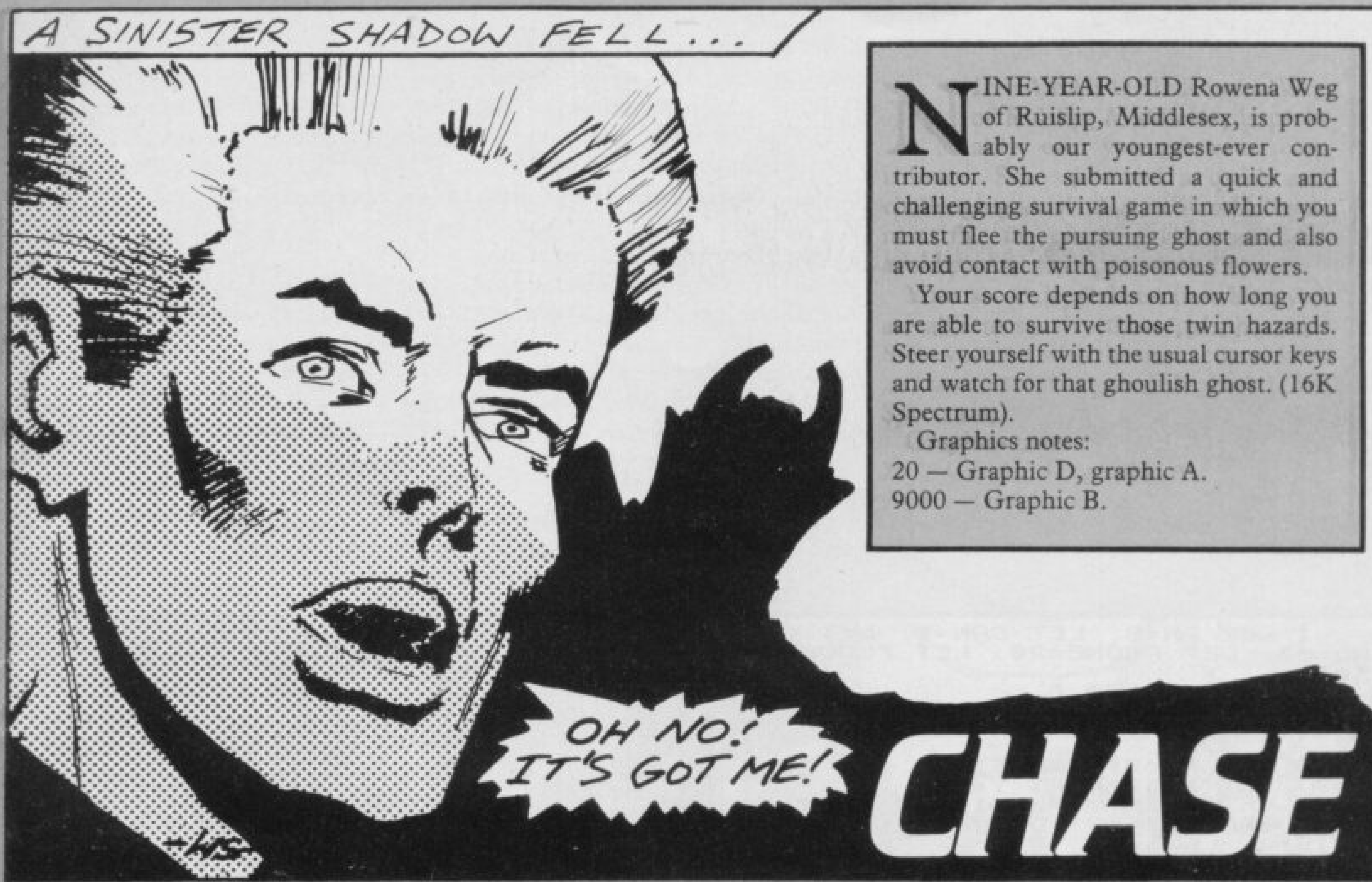
1K GAMBLER



1K GAMBLER is an uncomplicated game for the unexpanded ZX-81 in which you are invited to predict whether a number selected at random between 1 and 14 will be succeeded by a higher or lower figure.

The numbers are displayed in sets of three. Each all-correct set will add £10 to your initial stake of £50; a single mistake will deduct £10. After 15 sets your winnings will be displayed. Equal numbers are allowed.

The game was submitted by Jack Goffin of Fleetwood, Lancashire, who reports his highest score as being £180 and his lowest as £70 (1K ZX-81).



NINE-YEAR-OLD Rowena Weg of Ruislip, Middlesex, is probably our youngest-ever contributor. She submitted a quick and challenging survival game in which you must flee the pursuing ghost and also avoid contact with poisonous flowers.

Your score depends on how long you are able to survive those twin hazards. Steer yourself with the usual cursor keys and watch for that ghoulish ghost. (16K Spectrum).

Graphics notes:
20 — Graphic D, graphic A.
9000 — Graphic B.

```
   1 GO SUB 9900: GO SUB 6000: L
ET t=0: LET hi=0
   2 CLS : PRINT AT 10,10; INVER
SE 1;"THE CHASE";AT 15,4; INVERS
E 0;"by  Rowena Weg (Age 9)"
   5 PAUSE 1000: CLS : PRINT AT
3,10; INVERSE 1;"THE CHASE": PRI
NT AT 5,0;"Do you want to accele
rate using SYMBOL SHIFT or do yo
u want to  be in full speed the
whole time.It is suggested that
at first   symbol shift should b
e used to  get familiar with the
 speed     at which you are trav
elling."
   6 INPUT "Type y for you to ha
ve full      speed the whole time
";s$: CLS : PRINT AT 3,10; INVER
SE 1;"THE CHASE": PRINT AT 5,0;"
Type 1 for full speed";AT 6,5;"2
 for medium speed";AT 7,5;"3 for
 slow speed": INPUT "speed?";s:
CLS
   7 IF s=1 THEN LET s1=.003
   8 IF s=2 THEN LET s1=0.01
   9 IF s=3 THEN LET s1=0.09
  10 LET x=2: LET y=2: LET e=20:
 LET n=27
  11 PRINT AT 0,0; INVERSE 1;"SC
ORE:";t;AT 0,15;"HI-SCORE:";hi:
RESTORE : GO SUB 9000
  20 PRINT AT e,n; INK 4; INK 0;
 FLASH 1; BRIGHT 1;"■";AT y,x; I
NK 5; INVERSE 0; FLASH 0; BRIGHT
 0;"#": BEEP s1,0
  25 PRINT AT e,n; INK 6;" ";AT
y,x; INK 5;" "
  30 LET tim=0: LET x1=0-(IN 614
38<>255-4)+(IN 63486<>255-16): L
ET y1=0+(IN 61438<>255-8)-(IN 61
438<>255-16): LET x1=x1+(INKEY$=
"(" OR (s$="y" AND x1=1))-(INKEY
$="%" OR (s$="y" AND x1=-1)): LE
T y1=y1+(INKEY$="&" OR (s$="y" A
ND y1=1))-(INKEY$="'" OR (s$="y"
 AND y1=-1)): LET e1=0-(y<e)+(y>
e): LET n1=0+(x>n)-(x<n)
  31 LET tim=tim+1: IF tim>3 THE
N LET e1=0: LET n1=0: LET tim=0:
 GO TO 33
  32 IF ATTR (e+e1,n+n1)=57 OR A
TTR (e+e1,n+n1)=59 OR ATTR (e+e1
,n+n1)=62 THEN LET e1=0+(RND>.5)
-(RND<.5): LET n1=0+(RND>.5)-(RN
D<.5): GO TO 31
  33 IF ATTR (y+y1,x+x1)=59 OR A
TTR (y+y1,x+x1)=57 THEN GO TO 80
00
  34 IF e=y AND n=x THEN GO TO 8
000
  35 LET x=x+x1: LET y=y+y1: LET
 e=e+e1: LET n=n+n1
  37 PRINT AT 0,6; INVERSE 1;t:
LET t=t+1
  40 GO TO 20
6000 CLS : PRINT AT 3,8; FLASH 1
;"Instructions"
6010 PRINT AT 8,5;"5 moves you l
eft"
6020 PRINT AT 9,5;"8 moves you r
ight"
6030 PRINT AT 10,5;"7 moves you
up"
6040 PRINT AT 11,5;"6 moves you
down"
6050 PRINT AT 21,0; INK 3;"Press
 any key to continue"
6060 IF INKEY$="" THEN GO TO 606
0
6070 RETURN
8000 REM player has lost
8005 PRINT OVER 1;AT e+e1,n+n1;
INK 4;"■"; OVER 1;AT y+y1,x+x1;
INK 5;"#": BEEP .03,0: BEEP .03,
-1: BEEP .03,-2: BEEP .03,-3: BE
EP .03,-2
8010 PRINT AT 10,7; BRIGHT 1;"Yo
u have  lost": INPUT "press ente
r to start again";z$
8011 IF hi<t THEN LET hi=t
8015 CLS : LET t=0: GO TO 2
9000 FOR a=1 TO 40: LET px=INT (
RND*29)+2: LET py=INT (RND*19)+2
: PRINT AT py,px; INK 3; INVERSE
 1;"#": NEXT a
9010 FOR a=1 TO 30: PRINT AT 1,a
; INK 1;"■": PRINT AT 21,a; INK
1;"■": NEXT a
9011 FOR a=1 TO 21: PRINT AT a,1
; INK 1;"■": PRINT AT a,31; INK
1;"■": NEXT a
9900 FOR c=1 TO 3: READ a$: FOR
a=0 TO 7: READ b: POKE USR a$+a,
b: NEXT a: NEXT c
9910 RETURN
9990 DATA "a",0,3,115,34,62,34,1
19,34
9991 DATA "b",165,36,255,36,36,2
55,36,165
9993 DATA "d",60,126,90,126,102,
126,126,126
9999 REM © Rowena Weg
```

ET means, of course, entirely terrestrial. This game features a peculiar, pot-bellied little creature — human, of course — and his attempts to telephone his home — to Earth, of course. To make the call, ET must find three pieces of red telephone and they, along with pieces of blue candy and a flower, are hidden in 15 holes. If ET touches a hole, he falls into it.

The controls are 1 for up, Q for down, N to go left, and M to waddle right. The A key is a special fire button which has several functions but is very costly on energy. If ET runs out of energy he will die.

To get out of a hole, you must press the fire button and then 1. The screen has two hidden zones of nine squares each. In the candy zone, signified by the appearance of the user-defined graphic J on the scoreboard, any sweets you have retrieved can be exchanged for energy by pressing fire. The flower gives instant extra energy.

If you have seven or more pieces of candy, they can be exchanged anywhere on the board. In the landing zone — u.d.g. I — you must find by trial and error the one position to enable you to call down ET's spacecraft, again with the fire button. You can call home, however, only after you have found all the pieces of the telephone.

The game suffers from being too dependent on chance; the only skill required is in remembering which holes you have already visited. The game is well-presented, even featuring some strangely familiar little tune. ET was sent by Mark Winn of Abergavenny, Gwent. (48K Spectrum).

Graphics notes:
45 — Graphic G
70 — Graphic I
75 — Graphic J
1001 — Graphic A
1060 — Graphic B, graphic A, graphic D, graphic C
3030 — Graphic E
3040 — Graphic F
3075 — Graphic E, graphic H, graphic F.

```
   1 LET PH=0: LET CAN=0: LET CA
ND=80: LET PHONE=20: LET FLOWER=
50
   5 POKE 23658,8
  10 GO SUB 1000
  15 BORDER 4: PAPER 4: INK 7: C
LS
  20 LET FL=0: LET ET=1: LET EN=
600: LET X=11: LET Y=31
  25 LET P=INT (RND*18)+2: LET O
=INT (RND*28)+2: DIM A(15): DIM
B(15)
  30 FOR F=1 TO 15
  35 LET A(F)=INT (RND*18)+4: LE
T B(F)=INT (RND*30)+1
  40 IF ATTR (A(F),B(F))<>39 THE
N GO TO 35
  45 PRINT AT A(F),B(F); INK 0;"
♣": NEXT F
  46 LET Q=INT (RND*18)+2: LET W
=INT (RND*27)+2: IF ATTR (Q,W)=3
2 THEN GO TO 46
  47 FOR F=0 TO 2: PRINT AT F,0;
 INK 5;"████████████████████████
████████": NEXT F: PRINT AT 1,1;
 PAPER 5;"ENERGY"
  48 LET P=INT (RND*18)+2: LET O
=INT (RND*28)+2: IF ATTR (P,O)<>
32 THEN GO TO 48
  50 IF P=Q OR O=W THEN GO TO 48
  52 RESTORE 5000: FOR F=1 TO 7:
 READ A,B: BEEP A,B: NEXT F
  55 IF ET=1 THEN PRINT AT X,Y;L
$(1);AT X-1,Y;L$(2): GO TO 70
  60 IF ET=0 THEN PRINT AT X,Y;R
$(1);AT X-1,Y;R$(2)
  65 IF INKEY$="A" THEN LET FL=1
: BEEP .2,-20: LET EN=EN-5
  70 IF (Q+1=X OR Q-1=X OR Q+2=X
 OR X=Q) AND  W=Y OR W=Y+1 OR W=
Y-1) THEN PRINT AT 1,16; PAPER 5
;"田"
  72 IF Q=X AND W=Y AND FL=1 AND
 PH>2 THEN GO TO 2000
  75 PRINT AT 1,16; PAPER 5;" ":
 IF (P=X OR P+1=X OR P-1=X) AND
(Y=O OR Y+1=O OR Y-1=O) THEN PRI
NT AT 1,16; PAPER 5;"@": IF FL=1
 THEN BEEP .3,-20: LET EN=EN-5:
IF CAN>0 THEN LET CAN=CAN-1: LET
 EN=EN+25: PRINT AT 1,28; PAPER
5;CAN
  77 IF FL=1 AND CAN>6 THEN LET
CAN=CAN-7: LET PH=PH+1: BEEP .2,
10: PRINT AT 1,28; PAPER 5;CAN;A
T 1,22;PH
  80 LET FL=0: IF INKEY$="M" AND
 Y<31 THEN LET EN=EN-1: PRINT AT
 X,Y;" ";AT X-1,Y;" ": LET Y=Y+1
: LET ET=0
  85 IF INKEY$="N" AND Y>0 THEN
LET EN=EN-1: PRINT AT X,Y;" ";AT
 X-1,Y;" ": LET Y=Y-1: LET ET=1
  90 IF INKEY$="Q" AND X<21 THEN
 LET EN=EN-1: PRINT AT X,Y;" ";A
T X-1,Y;" ": LET X=X+1
  95 IF INKEY$="1" AND X>4 THEN
LET EN=EN-1: PRINT AT X,Y;" ";AT
 X-1,Y;" ": LET X=X-1
 100 PRINT AT 1,8; PAPER 5;"
  ";AT 1,8; PAPER 5;INT EN: IF A
TTR (X,Y)=32 OR ATTR (X-1,Y)=32
THEN GO SUB 3000
 105 BEEP .002,EN/20: IF EN<1 TH
EN GO TO 9000
```



```
 110 IF INKEY$="A" THEN BEEP .2,
-20: LET EN=EN-5: LET FL=1
 120 GO TO 55
 999 STOP
1000 FOR F=USR "■" TO USR "■"+7
1010 READ A: POKE F,A: NEXT F
1020 DATA 62,127,127,127,14,6,6,
14,30,62,62,62,30,10,10,21
1030 DATA 124,254,254,124,112,96
,96,112,120,124,124,124,120,80,8
0,168
1040 DATA 34,85,34,36,126,60,24,
24,0,0,8,93,127,93,8,0
1050 DATA 0,16,62,126,255,126,12
4,8,0,0,246,220,200,30,28,0
1055 DATA 254,146,146,254,146,14
6,254,0,0,60,66,219,219,66,60,0
1060 DIM R$(2,1): DIM L$(2,1): L
ET L$(1)="■": LET L$(2)="■": LET
 R$(1)="■": LET R$(2)="■"
1065 DIM H(15)
1070 FOR F=1 TO 3
1080 LET D=INT (RND*15)+1: IF H(
D)<>0 THEN GO TO 1080
1090 LET H(D)=PHONE: NEXT F
1200 FOR F=1 TO 9
1210 LET G=INT (RND*15)+1: IF H(
G)<>0 THEN GO TO 1210
1220 LET H(G)=CAND: NEXT F
1230 LET R=INT (RND*15)+1: IF H(
R)<>0 THEN GO TO 1230
1235 LET H(R)=FLOWER
1240 RETURN
2000 REM LANDING
2002 IF Y<2 THEN LET Y=2
2005 IF Y>29 THEN LET Y=29
2010 CLS
2012 DIM S$(4,3)
2015 PRINT AT 16,Y; INK 7;"■";AT
 15,Y;"■"
2020 FOR F=1 TO 6: BEEP .1,30: F
OR G=1 TO 100: NEXT G: NEXT F
2030 LET S$(1)=CHR$ 132+CHR$ 140
+CHR$ 136: LET S$(2)=CHR$ 133+CH
R$ 128+CHR$ 138: LET S$(3)=S$(2)
: LET S$(4)=CHR$ 139+CHR$ 131+CH
R$ 135
2040 FOR F=4 TO 17
2045 IF INKEY$<>"" THEN GO TO 90
00
2050 BEEP .35,-30: BEEP .15,-32
2052 IF INKEY$<>"" THEN GO TO 90
00
2055 PRINT AT F-4,Y-1;"   "
2060 FOR H=0 TO 3: PRINT AT F-H,
Y-1;. INK 1;S$(4-H): NEXT H: NEXT
 F
2070 PRINT AT 16,Y; INK 7;"■";AT
 15,Y;"■"
2080 BEEP 1,20
2085 PRINT AT 17,Y-1;"   "
2090 FOR F=16 TO 4 STEP -1
2100 FOR H=0 TO 3: PRINT AT F-H,
Y-1; INK 1;S$(4-H): NEXT H: PRIN
T AT F-1,Y; INK 7;"■";AT F-2,Y;"
■": BEEP .35,-30: BEEP .15,-32:
PRINT AT F,Y-1;"   ": NEXT F
2110 CLS
2120 PRINT AT 10,1;"WELL DONE YO
U HAVE SAVED ET"'''" PRESS'Q' TO
QUIT OR 'Y'TO START"
2125 PAUSE 50: RESTORE 5000: FOR
 F=1 TO 7: READ A,B: BEEP A,B: N
EXT F
2130 IF INKEY$="Q" THEN STOP
2140 IF INKEY$="Y" THEN RUN
2150 GO TO 2130
3000 REM HOLE
3010 FOR G=1 TO 15: IF (X=A(G) O
R X-1=A(G)) AND Y=B(G) THEN GO T
O 3030
3020 NEXT G: GO TO 3060
3030 IF H(G)=FLOWER THEN LET P$=
"■": LET TOT=60: GO TO 3070
3040 IF H(G)=CAND THEN LET P$="■
": LET TOT=20: GO TO 3070
3050 IF H(G)=PHONE THEN LET P$="
■": LET TOT=30: GO TO 3070
3060 LET TOT=0: LET P$=" "
3070 PAPER 5: INK 0: BORDER 0: C
LS
3071 LET H(G)=0
3072 FOR G=0 TO 16: PRINT AT G,0
;"■";TAB 31;"■": NEXT G: FOR G=1
7 TO 21: PRINT AT G,0;"■■■■■■■■■
■■■■■■■■■■■■■■■■■■■■■■■": NEXT G
: PRINT AT 16,1;"■";TAB 30;"■"
3073 PRINT AT 14,1;"■";TAB 30;"■
";AT 15,1;"■■";TAB 29;"■■";AT 16
,1;"■■■";TAB 28;"■■■"
3074 FOR G=0 TO 3: PRINT AT G,0;
"■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■
■": NEXT G
3075 PRINT AT 16,10; INK 4*(P$="
■")+2*(P$="■")+(P$="■");P$
```



```
3080 FOR F=5 TO 16
3090 PRINT AT F,20; INK 7;"■";AT
 F-1,20;"■";AT F-2,20;" "
3100 BEEP .1,40-F
3110 NEXT F
3120 LET M=20
3130 PRINT AT 16,M;" ";AT 15,M;"
 "
3135 LET EN=EN-1: IF EN<0 THEN G
O TO 9000: IF P$=" " THEN GO TO
3180
3137 IF P$=" " THEN PRINT AT 16,
M; INK 7;"■";AT 15,M;"■": FOR F=
1 TO 40: NEXT F: GO TO 3180
3140 LET M=M+(INKEY$="M" AND M<2
8)-(INKEY$="N" AND M>4)
3145 BEEP .06,30
3150 PRINT AT 16,M; INK 7;"■";AT
 15,M;"■"
3160 IF M=10 THEN LET EN=EN+TOT:
 BEEP 1,TOT: GO TO 3180
3170 GO TO 3130
3180 LET U=16
3185 IF INKEY$<>"A" THEN GO TO 3
185
3187 LET EN=EN-5
3190 PRINT AT U,M;" ";AT U-1,M;"
 ": BEEP .06,30
3195 LET EN=EN-1.5: IF EN<0 THEN
 GO TO 9000
3200 LET U=U+(INKEY$="Q" AND U>1
6)-(INKEY$="1")
3202 IF INKEY$<>"1" THEN LET U=U
+1: IF U>16 THEN LET U=16
3205 PRINT AT U,M; INK 7;"■";AT
U-1,M;"■"
3210 IF U=3 THEN GO TO 3230
3220 GO TO 3190
3230 PRINT AT U,M;" ";AT U-1,M;"
 ": FOR F=-10 TO 20: BEEP .01,F:
 NEXT F
3240 BORDER 4: PAPER 4: INK 7: C
```

```
LS : GO SUB 4000
3242 FOR F=0 TO 2: PRINT AT F,0;
 INK 5;"[redacted]": NEXT F: PRINT AT 1,1;
 PAPER 5;"ENERGY:";EN
3245 IF ATTR (X,Y)=32 THEN LET X
=X+1: GO TO 3245
3250 LET X=INT (RND*17)+5: LET Y
=INT (RND*31)+1: IF ATTR (X,Y)=3
2 THEN GO TO 3250
3255 IF M=10 AND P$="*" THEN LET
 CAN=CAN+1
3256 PRINT AT 1,28; PAPER 5;CAN
3257 IF P$="#" THEN LET PH=PH+1
3258 PRINT AT 1,22; PAPER 5;PH
3260 RETURN
3999 STOP
4000 REM HOLES
4010 FOR F=1 TO 15
4050 PRINT AT A(F),B(F); INK 0;"
*": NEXT F
4060 RETURN
5000 DATA 1,5,1.2,12,.2,10,.2,9,
.2,7,.8,9,1,5
5090 DATA 1,5,1.2,12,.2,10,.2,9,
.2,7,.8,9,1,5
5100 RETURN
9000 REM  DEAD
9010 CLS
9020 PRINT AT 2,0;" UNFORTUNATEL
Y ET HAS PERISHED        DUE TO LA
CK OF ENERGY. "
9030 IF CAN>5 THEN PRINT '" BUT
FORTUNATELY HE DIED WITH A SWEET
 TASTE IN HIS MOUTH AS YOU MANAG
ED TO RETRIEVE ";CAN;" PIECES OF
": PRINT "CANDY"
9035 RESTORE 5000: FOR F=1 TO 7:
 READ A,B: BEEP A,B: NEXT F: FOR
 F=1 TO 50: NEXT F
9040 PRINT ''"PRESS 'Q' TO QUIT
OR 'Y'TO START"
9045 PRINT AT 16,Y; INK 7;"8";AT
 15,Y;"?"
9047 PRINT AT 16,Y; INK 2;"8";AT
 15,Y;"?"
9050 IF INKEY$="Q" THEN STOP
9060 IF INKEY$="Y" THEN RUN
9065 BEEP .1,0
9070 GO TO 9045
```



MACHINE CODE CONVERTER

ALL SINCLAIR users will be aware of the benefits of using machine code. Its increased speed is such that plodding Basic graphics are displayed with all the qualities of an animated film. So far, however, there has been no simple way of converting Basic into the speedier form.

Now a brilliant piece of programming enables the Basic programmer to convert his listing automatically into machine code by LOADing from a tape or by entering the program line by line from the keyboard.

The listing should be entered as listed — 25 zeros in the REM line — then RUN, followed by the accompanying list of numbers entered with NEWLINE in place of the commas. The numbers will be displayed on-screen for checking; when the screen is full, enter CONT for further display. When the numbers have all been input, inverted commas will appear. Enter your Basic listing line by line, or the name of your program, if using tape.

Machine Code Converter was submitted by John Sidney of 1 April Way, Coddingly, London WC IN. (16K ZX-81).

```
   5 REM 0000000000000000000000000
00
  10 FOR K=16514 TO 16538
  20 INPUT A
  21 IF A=156 THEN GOTO 30
  35 PRINT K,A
  36 IF A=125 THEN CLS
  37 IF A=125 THEN GOTO 55
  38 LET A=A+26
  40 POKE K,A
  50 NEXT K
  55 LET A$=""
  60 INPUT B$
  70 FOR K=16514 TO 16538
  80 LET A$=A$+CHR$ ((PEEK K)+10
2)
  90 NEXT K
  91 CLS
  95 FOR K=1 TO 20
 100 PRINT A$
 105 NEXT K
 106 FOR K=1 TO 19
 107 SCROLL
 108 NEXT K
 110 PAUSE 4E4
 120 RAND USR 16514

38,53,55,46,49,0,43,28,28,49,0,5
6,46,51,40,49,38,46,55,0,58,56,4
2,55,56,
```

81 Inverter

THIS SHORT subroutine is designed to change any input five-letter word into its inverse video mode, something which is useful in many programs as a way of highlighting games results, players' names and so on.

The listing was submitted by A Boucher of Mansfield, Nottinghamshire. (1K ZX-81).

```
   3 DIM L(5)
   4 DIM L$(5)
   5 DIM I$(5)
  10 INPUT I$
  20 FOR F-1 TO 5
  25 LET S$=I$(F TO F)
  30 LET L(F)-CODE S$
  40 IF L(F)<129 THEN LET L$(F)=
CHR$ (L(F)+128)
  45 IF L(F)>128 THEN LET L$(F)=
CHR$ (L(F)-128)
  50 NEXT F
  60 PRINT AT 0,0;I$;"=";L$(1 TO
 5)
  65 STOP
```

FANCY BORDER

ARTHUR DOUGLAS of London E4 has sent a short machine code listing for our useful subroutines spot. His program puts a fancy border instantly round the screen, consisting of the character poked into the spare location 23681.

The second part of the program loads the user-definable variables with a few examples of interesting borders. (16K Spectrum).

```
  20 FOR J=32500 TO 32576
  30 READ A: POKE J,A: LET X=X+A
  40 NEXT J: IF X<>9060 THEN PRI
NT "ERROR IN DATA": STOP
  50 DATA 62,2,205,1,22,58,129,9
2,1,33,23,22,20,205,39,127,1,2,2
3,22,20,205,39,127,1,33,24,245
  60 DATA 205,217,13,241,22,32,2
05,56,127,1,33,3,245,205,217,13,
241,22,32,205,56,127,201,213,197
  70 DATA 245,205,217,13,241,245
,215,241,193,5,209,21,32,240,201
,213,245,215,241,209,21,32,245,2
01
  80 FOR J=USR CHR$ 144 TO USR C
HR$ 154-1
  90 READ A: POKE J,A: NEXT J
 100 DATA 60,102,195,129,129,195
,102,60
 110 DATA 153,51,102,204,153,51,
102,204
 120 DATA 0,255,0,255,0,255,0,25
5
 130 DATA 8,28,62,127,62,28,8,0
 140 DATA 60,66,153,165,165,153,
66,60
 150 DATA 0,73,42,28,127,28,42,7
3
 160 DATA 128,193,227,247,2≥9,19
3,131,1
 170 DATA 102,195,153,60,60,153,
195,102
 180 DATA 255,255,0,0,255,255,0,
0
 190 DATA C35,129,189,165,165,18
9,129,255
 200 FOP J=144 TO 153
 210 POKE 23681,J
 220 RANDOMIZE USR 32500
 230 PRINT #0;AT 0,0;"Press Any
key"
 240 PAUSE 0: NEXT J
```



BOOMER

BOOMER is a catchem game during which a mad bomber rains explosives on you and, instead of running away, you must attempt to intercept them. The bomber goes lower and lower and faster and faster, Invaders-style, and you must race left and right with keys 5 and 8 before your lives are all used up.

A neat listing from Ross Henderson of Perth, Scotland, though the user-definable instructions could do with a few FOR NEXT loops. (16K Spectrum).

Graphics notes:
170 — Graphic A
180 — Graphic S
190 — Graphic D
200 — Graphic G
221 — Graphic F.

```
   0 REM © Ross Henderson
  10 REM "boomer"
  20 REM define boomer
  30 POKE USR "a",BIN 00011000
  31 POKE USR "a"+1,BIN 00100100
  32 POKE USR "a"+2,BIN 01000010
  33 POKE USR "a"+3,BIN 10100101
  34 POKE USR "a"+4,BIN 10100101
  35 POKE USR "a"+5,BIN 10000001
  36 POKE USR "a"+6,BIN 10111101
  37 POKE USR "a"+7,BIN 01000010
  40 POKE USR "s",BIN 00111100
  41 POKE USR "s"+1,BIN 00111100
  42 POKE USR "s"+2,BIN 01111110
  43 POKE USR "s"+3,BIN 11111111
  44 POKE USR "s"+4,BIN 11011011
  45 POKE USR "s"+5,BIN 11011011
  46 POKE USR "s"+6,BIN 11011011
  47 POKE USR "s"+7,BIN 00011000
  50 POKE USR "d",BIN 00011000
  51 POKE USR "d"+1,BIN 00011000
  52 POKE USR "d"+2,BIN 01111110
  53 POKE USR "d"+3,BIN 01100110
  54 POKE USR "d"+4,BIN 01100110
  55 POKE USR "d"+5,BIN 01100110
  56 POKE USR "d"+6,BIN 11100111
  57 POKE USR "d"+7,BIN 11100111
  60 REM define bomb
  61 POKE USR "f",BIN 00000000
  62 POKE USR "f"+1,BIN 00001000
  63 POKE USR "f"+2,BIN 00010000
  64 POKE USR "f"+3,BIN 00011000
  65 POKE USR "f"+4,BIN 00111100
  66 POKE USR "f"+5,BIN 01111110
  67 POKE USR "f"+6,BIN 01111110
  68 POKE USR "f"+7,BIN 00111100
  70 REM define catcher
  71 POKE USR "g",BIN 11011011
  72 POKE USR "g"+1,BIN 10111101
  73 POKE USR "g"+2,BIN 10011001
  74 POKE USR "g"+3,BIN 11111111
  75 POKE USR "g"+4,BIN 00011000
  76 POKE USR "g"+5,BIN 00111100
  77 POKE USR "g"+6,BIN 00100100
  78 POKE USR "g"+7,BIN 01100110
  80 BORDER 2: PAPER 6: INK 0: C
LS : PRINT AT 10,7;"Instructions
(y/n)": PAUSE 0: IF INKEY$="y" T
HEN GO SUB 9000
  90 REM main program
  96 LET high=0
 101 BRIGHT 1: FLASH 0: INK 0: P
APER 6: BORDER 1: CLS
 102 LET bombs=0: LET lives=4
 103 LET y=0
 110 LET cx=15: LET cy=20
 120 LET lives=lives+2
 135 LET p=0
 140 LET by=2
 150 LET bx=INT (RND*25)+1
 155 IF p=0 THEN LET by=y+3
 160 FOR x=1 TO 30
 166 PRINT AT 21,1;"Score=";bomb
s
 167 PRINT AT 21,11;"Lives=";liv
es
 168 PRINT AT 21,22;"High=";high
 169 IF lives<=0 THEN GO TO 9998
 170 PRINT INK 0;AT y,x;" Ⓐ"
 180 PRINT INK 2;AT y+1,x;" ♣"
 190 PRINT INK 1;AT y+2,x;" Ħ"
 200 PRINT AT cy,cx-1;" Ψ "
 205 IF INKEY$="5" THEN LET cx=c
x-1
 206 IF INKEY$="8" THEN LET cx=c
x+1
 207 IF cx>30 THEN PRINT AT 20,3
0;"  ": LET cx=1
 208 IF cx<1 THEN PRINT AT cy,cx
-1;"  ": LET cx=30
 210 IF x=bx THEN LET p=1
 213 IF INT (by)<>20 THEN GO TO
216
 214 IF cx=bx THEN BEEP 0.02,20:
 BEEP 0.05,30: LET bombs=bombs+1
0: GO TO 215
 215 IF NOT cx=bx THEN PRINT AT
by,bx; INK 2;"■": BEEP 0.5,-40:
PRINT AT by,bx;" ": LET lives=li
ves-1
 216 IF by>19 THEN LET p=0: CLS
: GO TO 300
 221 PRINT AT by,bx;" ": IF p=1
THEN LET by=by+1: PRINT INK 2;AT
 by,bx;"♠": BEEP 0.009,-by+10
 230 NEXT x
 232 LET by=by+1: LET y=y+1: IF
y>15 THEN GO TO 9100
 240 CLS
 250 GO TO 160
 300 IF p=0 THEN LET by=y+2: LET
 p=0: LET bx=INT (RND*30)+1
 310 IF x<30 THEN NEXT x
 320 GO TO 160
9000 BORDER 5: INK 0: PAPER 7: C
LS : PRINT ''"            B o o m
e r"
9010 PRINT ''"Hello my name is B
oomer !!"
9020 PRINT INK 0;'"  Ⓐ";"   This
"
9030 PRINT INK 2;"  ♣"; INK 0;"
  is"
9040 PRINT INK 1;"  Ħ"; INK 0;"
  ME"
9050 PRINT ''"Some people think
I'm mad but   all I do is drop b
ombs on folk"''"It just so happe
ns that I am    going to drop so
me bombs on  you"''"So get catch
ing!!"''"
            <-"; FLASH 1;"
5"; FLASH 0;"    "; FLASH 1;"8";
FLASH 0;"->"
9055 PAUSE 0: CLS
9060 RETURN
9100 CLS
9200 FOR n=1 TO 20 STEP 2: PAUSE
 2: BEEP 0.05,n: NEXT n
9220 PAUSE 10: FOR n=1 TO 5: BEE
P 0.09,n: NEXT n
9300 GO TO 103
9998 IF bombs>high THEN LET high
=bombs
9999 FLASH 1: PAPER 2: INK 7: CL
S : PRINT AT 10,4;"Boomer has be
aten you !!!": FOR n=0 TO -25 ST
EP -1: PAUSE 2: BEEP 0.02,n: BEE
P .01,n+5: NEXT n: PAUSE 10: FLA
SH 0: PAPER 6: INK 0: CLS : PRIN
T AT 10,10;"ANOTHER GO?": PAUSE
0: CLS : IF INKEY$="y" THEN GO T
O 100: STOP
```

```
   1 REM FIVES by WILLUM 1983
   2 REM Move using 5 6 7 8
   3 FOR t=1 TO 7: READ n
   4 POKE USR "b"+t,n: NEXT t
   5 DATA 60,126,219,255,255,231
,126,60
   6 LET h=0
   7 PLOT 248,168: DRAW -241,0:
DRAW 0,-161: DRAW 241,0: DRAW 0,
160
   8 PRINT AT 21,14;"FIVES"
  10 LET ao=8: LET bo=8: LET s=5
0: LET an=0: LET bn=0
  15 GO SUB 100
  20 LET a$=INKEY$
  25 LET an=ao+(a$="6")-(a$="7")
  27 LET bn=bo+(a$="8")-(a$="5")
  30 IF an=21 OR an=0 THEN LET a
n=ABS (an-20)
  32 IF bn=31 OR bn=0 THEN LET b
n=ABS (bn-30)
  35 IF SCREEN$ (an,bn)="5" THEN
 LET s=s+5: BEEP 0.1,-50+s: GO S
UB 100
  36 IF SCREEN$ (an,bn)="#" THEN
 LET s=s-10: BEEP 0.2,2: GO SUB
100
  40 PRINT AT 0,0;s
  45 PRINT AT an,bn; INK 1;"●"
  60 IF LEN a$=0 THEN GO TO 20
  65 PRINT AT ao,bo; INK 4;"#"
  75 LET ao=an: LET bo=bn
  80 GO TO 20
 100 LET c=(RND*29)+1
 110 LET d=(RND*19)+1
 130 PRINT AT d,c; INK 2;5
 132 IF s<=100 THEN PRINT AT 0,2
;" "
 138 IF s<=0 THEN PRINT AT 0,10;
"PATHETIC____"
 150 IF s>=100 THEN : CLS : LET
h=h+1: PRINT AT 0,15;h;" Hundred
": GO TO 7
 160 RETURN
```

FIVES, by Philip Williams of Plymouth, Devon, is a surround game with extras. Using the usual cursor keys, you steer yourself round the screen attempting to snaffle as many of the randomly-appearing figure fives as possible.

You start with 50 points. After that, you collect five for every 5 you get but your tally is cut by two 5s if you cut your tail to get to 5s. Clear? (16K Spectrum).

Graphics notes: 45 — Graphic B.





ZX81 & 16K

THE TOMB OF DRACULA!



3D HORROR ADVENTURE GAME!

Occupying over 13½K of memory, a superb 3D graphics adventure game for the ZX81 with 16K RAM, **for only £3.95!** **Enter** Dracula's tomb at 30 minutes to sunset . . . **wander** through the tomb's pre-mapped 300 vaults in search of the fabled Vampire's Treasure . . . **pick up** valuable silver stakes and use them to defend yourself against the lurking horrors . . . ghouls, zombies, pits of primaeval slime . . . **See** them all on the ZX81's plan of the tomb . . . when it will let you! **Take** a chance on a Mystery Vault . . . if you dare! And all the time the minutes are ticking by to sunset . . . when **Dracula** rises from his coffin and comes after **you**! Each of the infinite levels of the tomb has its own 300 vaults . . . go as deep as you like, the Prince of Darkness will seek you out in his blood-lust! **WARNING**: people of an exceptionally nervous disposition should play this game only during the hours of daylight! Special facility enables a game in progress to be saved on tape so you can continue it whenever you choose.

STOP PRESS. Dracula now available on 48K Spectrum colour and sound. **Price £4.95 inc. P&P.**

Price of only **£3.95** includes ready-to-load cassette with library case and inlay, full instructions, postage and packing. Order today! Money refunded if not delighted! Send cash, P.O. or cheque to:

MOVIEDROME VIDEO (Dept. **SU9**).
19 Leighton Avenue, Pinner HA5 3BW.

GAMES FOR 16K SPECTRUM

SUPERPLAY-1 £5
by William Smith

Five different games, some of them entirely original, which should appeal to fourteen year olds of all ages!

Using a combination of BASIC and machine code — for extra zip this cassette contains the following:-

KONGO Move your man along girders and up ladders to reach the terrible kongo. Avoid the deadly patches of red jelly and watch out for kongo's patrolling warriors.

ROBOT RESCUE Guide your ship through a meteor storm to reach the landing pad and bring the stranded astronaut back to the mother ship.

HIGHWAY RUNNER Get your family of frogs safely across the M1.

BIG GAME HUNTER Shoot the advancing hordes of wild lions and rhinos.

UFO Protect your planet from the aliens with their deadly torpedoes. Be sure you don't exhaust your supply of lasers.

ALL FIVE GAMES FOR £5.

All games feature high score and on-screen score total.

SOLO-WHIST £5
by J.A. Yates

This is an excellent simulation of the well known card game and makes a fascinating change from the usual arcade type computer game.

The computer deals the cards and you play your hand against three opponents who are controlled by the computer.

A running total of tricks won is kept on the screen and you have to use considerable skill to beat the computer.

The graphics are of a high standard and you will soon forget that you are using a computer and you will become absorbed in the battle of wits with your three hard bitten opponents.

VIDEO
SOFTWARE LIMITED
STONE LANE. KINVER. STOURBRIDGE.
WEST MIDLANDS DY7 6EQ. ENGLAND
TEL: KINVER 2462   STD 038 483 2462

DON'T MISS THIS INCREDIBLE OFFER!

50 GAMES £9·95!

CASSETTE 50 FOR YOUR MICRO



GALACTIC ATTACK
SPACE MISSION
LUNAR LANDER
PLASMA BOLT
STARTREK
RADAR LANDING
ATTACKER
GALACTIC DOGFIGHT
ZION ATTACK
IVASIVE ACTION
OXO
BOGGLES
PONTOON
SKI JUMP
HANGMAN
OLD BONES
THIN ICE
MAZE EATER
ORBITTER
MOTORWAY
FORCE FIELD
NIM
TUNNEL ESCAPE
BARREL JUMP
CANNONBALL BATTLE
OVERTAKE
SITTING TARGET
SMASH THE WINDOWS
SPACE SHIP
JET FLIGHT
PHASER
INTRUDER
INFERNO
GHOSTS
SUBMARINES
ROCKET LAUNCH
PLANETS
BLACK HOLE
DYNAMITE
DO YOUR SUMS
DERBY DASH
SPACE SEARCH
UNIVERSE
RATS
TANKER
PARACHUTE
JETMOBILE
HIGH RISE
THE FORCE
EXCHANGE



CASCADE SOFTWARE

NOW AVAILABLE FOR

sinclair SPECTRUM
ZX81
LYNX
DRAGON
ATARI
apple (ON DISC & CASSETTE)
VIC-20
ACORN ATOM
ORIC-1
SHARP
NEW BRAIN
BBC A/B

MINIMUM SIZE COMPUTER REQUIRED ONLY

ORDER NOW

only £9·95 inc. V.A.T. & Post & Packaging

DIRECT MAIL ORDER FORM

CASCADE SOFTWARE
CASCADES HOUSE
BARGAN'S LANE
LLANDOGO
GWENT
S.WALES NP54PA

SUPPLY CASSETTE 50 FOR ______ COMPUTER
I enclose cheque/P.O.
Name ______
Address ______

SU1/2

Save almost £20 on exclusive package



ZX Printer plus two cassettes

To mark our first anniversary, we have been able to negotiate with Sinclair Research a special offer to readers of *Sinclair User*.

For only £59.95 plus £2.95 postage and packing you can buy the amazing ZX Printer plus two of the popular programs from the Sinclair range, Club Record Controller and Collectors' Pack. This is a saving of £19.90.

Stocks are limited so be sure to place your order quickly. Please indicate for which machine the package is required. Allow 28 days for delivery.

The offer applies to the United Kingdom only.

To: Sinclair User Anniversary Offer, ECC Publications, 30-31 Islington Green, London N1 8BJ.

Please send me ________ ZX Printer packages at the special *Sinclair User* price of £59.95 plus £2.95 postage and packing.

Please indicate for which machine the printer and cassettes are required ☐ZX-81 ☐Spectrum

*I enclose a cheque/postal order made payable to ECC Publication for £________

*Please charge my Access/Barclaycard/Trustcard account no.____________

*Please complete/delete as applicable

Signature ____________________

Name: (Mr/Mrs/Miss) ____________________

Address ____________________

ORWIN SOFTWARE: ZX81 CASSETTES

THE BEST SOFTWARE (BY VARIOUS AUTHORS) AT LOW PRICES

"Michael Orwin's £5 Cassette Two is very good value. It contains 10 stolid well designed games which work, offer plenty of variety and choice, and are fun."

Your Computer, May '82

"Michael Orwin has built a reputation for value-for-money software and his Cassette 4 offers quantity as well as quality."

Sinclair User, October '82

"If each game was on a separate tape and selling for £5 each I would still recommend them. But all on one for £5 . . . ! This sort of value for money just has not been seen before on any personal computer."

"Without sounding pushy I would like to conclude this review by saying — if you have a ZX81 and like games, then you should buy Michael Orwin's cassette 4."

2 extracts from *ZX Computing*, Oct/Nov '82

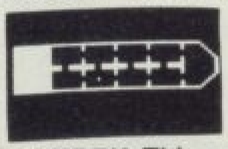
"Eight games, including an excellent version of the Scramble arcade game, three-dimensional noughts and crosses, dropping bombs on sprouting plants and a western style shoot-out. Easy to operate, graphically impressive and good value for money."

The Times, Saturday 11th December 1982 (*about Cassette 4*)

CASSETTE 1
(eleven 1k programs)
Machine code:
React, Invaders, Phantom aliens, Maze of death, Planet lander, Bouncing letters, Bug splat.
Basic:
I Ching, Mastermind, Robots, Basic Hangman. PLUS Large screen versions of Invaders and Maze of Death, ready for when you get 16k.
Cassette One costs £3.80

CASSETTE 2
Ten games in Basic for 16k ZX81
Cassette Two contains Reversi, Awari, Laser Bases, Word Mastermind, Rectangles, Crash, Roulette, Pontoon, Penny Shoot and Gun Command.
Cassette Two costs £5.

CASSETTE 3
8 progams for 16k ZX81
STARSHIP TROJAN

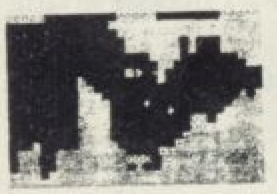


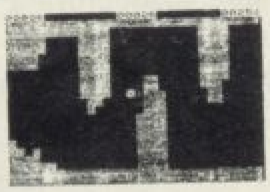
Repair your Starship before disaster strikes. Hazards include asphyxiation, radiation, escaped biological specimens and plunging into a Supernova.

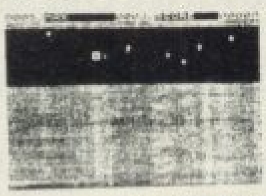
STARTREK This version of the well known space adventure game features variable Klingon mobility, and graphic photon torpedo tracking.
PRINCESS OF KRAAL An adventure game.
BATTLE Strategy game for 1 to 4 players.
KALABRIASZ World's silliest card game, full of pointless complicated rules.
CUBE Rubik Cube simulator, with lots of functions including 'Backstep'.
SECRET MESSAGES This message coding program is very txlp qexi jf.
MARTIAN CRICKET A simple but addictive game (totally unlike Earth cricket) in machine code. The speed is variable, and its top speed is very fast.
Cassette Three costs £5.

CASSETTE 4 **8 games for 16k ZX81**

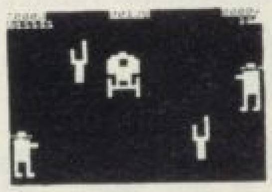
ZX-SCRAMBLE (machine code) with 3 stages.
Bomb and shoot your way through the fortified caves.



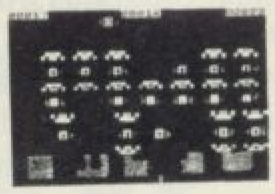


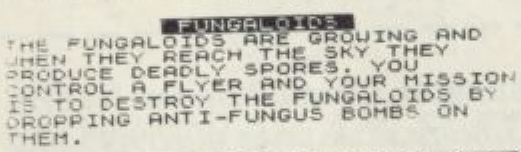


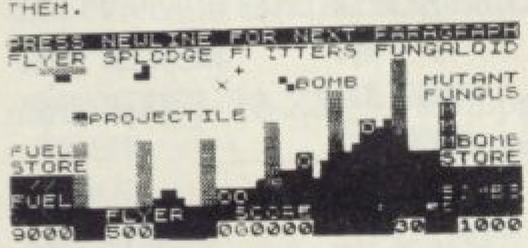
GUNFIGHT
(machine code)



INVADERS
(machine code)





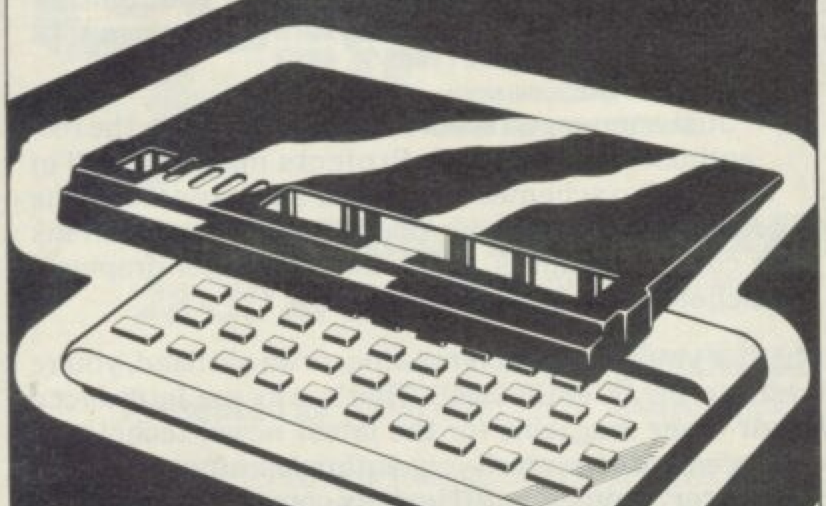


GALAXY INVADERS (machine code)
Fleets of swooping and diving alien craft to fight off.
SNAKEBITE (machine code)
Eat the snake before it eats you. Variable speed. (very fast at top speed).
LIFE (machine code)
A ZX81 version of the well known game.
3D TIC-TAC-TOE (Basic)
Played on a 4×4×4 board, this is a game for the brain. it is very hard to beat the computer at it.

7 of the 8 games are in machine code, because this is much faster than Basic. (Some of these games were previously available from J. Steadman). Cassette 4 costs £5.

Please make cheques payable to ORWIN SOFTWARE. Recorded on high quality cassettes, sent by first class post from:
ORWIN SOFTWARE, Dept. OSU, 26 Brownlow Road, Willesden, London NW10 9QL.

SPECTRUM COMPUTER COVER & STAND



PROTECT YOUR SPECTRUM WITH THIS ATTRACTIVE HIGH FINISH COVER.

★ UNIT DOUBLES AS STAND FEATURING SUPPORTS AND COMPUTER LOCATIONS

INC. P.&P.
£6-99

COMPUTER CASES & COVERS
8 Cropston Ave., Loughborough, Leics. LE11 0PR
Tel. 0509 239094



EXPLORING SPECTRUM BASIC
Complements the Sinclair manual by explanations of BASIC programming techniques supported by over 50 full games & serious programs. 191 pages. £4.95

THE EXPLORERS GUIDE TO THE ZX81
The book for the ZX81 enthusiast. 152 pages of games, application and utility programs plus much useful information on machine language and hardware. "Immediate and lasting value" (P.C.W.). £4.95

Available from leading bookshops and computer stores, or direct from Timedata (U.K. P&P free, overseas customers add £1.50 per item for surface mail).

TIMEDATA Ltd. Dept. H
16 Hemmells, Laindon, Basildon, Essex. SS15 6ED
Tel.: (0268) 418121

TIMEDATA

JOIN THE USERS' CLUB

FREE BOOK!

Make the most of your Spectrum or ZX81 by joining the country's strongest and most enthusiastic users' club—the National ZX Users' Club.

When you join us, we'll send you our 'new members welcome pack' with *30* programs (15 for the ZX81, 15 for the Spectrum), plus the first issue of our value-packed club magazine INTERFACE.

Inside INTERFACE as well as at least six programs for your ZX81 or Spectrum, you'll find letters from members as they share tips and ideas, and sound off on a variety of subjects (such as you-know-who's appalling delivery times record), a list of local ZX clubs, and special offers from software houses and book publishers—special offers just for members.
If you're having problems with your computer, we have experts on tap to try and help you. If you want to start a local users' club, we'll give you publicity, and let you buy books at a special discount for your club members.
If you're not a club member, you're missing out on making the most of your micro (and try saying that ten times quickly!) Come on in and join us, the water's fine. It's £9.50 for a year's INTERFACE, and we'll send you a sample issue for £1.00

Run by Tim Hartnell, the National ZX Users' Club is a resource just waiting to be tapped. Come on and start tapping.

National ZX Users' Club,
Dept. *SU*
44-46 Earls Court Road,
London, W8 6EJ

OK, Tim, you've convinced me:

( ) Send me my 'new members' welcome pack' plus my first issue of INTERFACE and keep those INTERFACES coming for the next year. I enclose £9.50 (UK), £12.50 (Europe)

( ) Just send me a sample of INTERFACE. I enclose £1.00

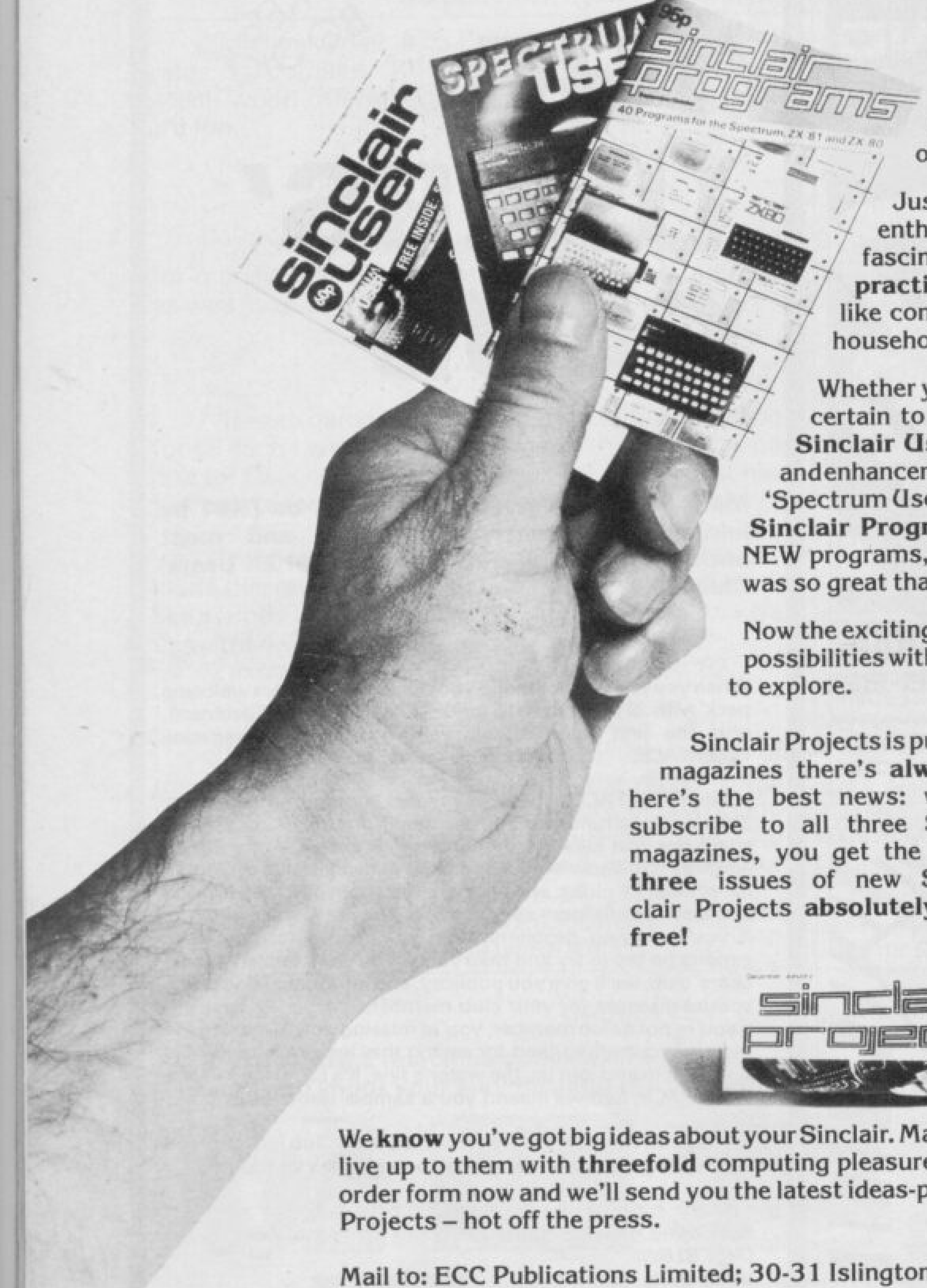
I have ( ) a ZX81 ( ) a Spectrum

Name ....

Address ....

....

We've got big ideas about you and your Sinclair



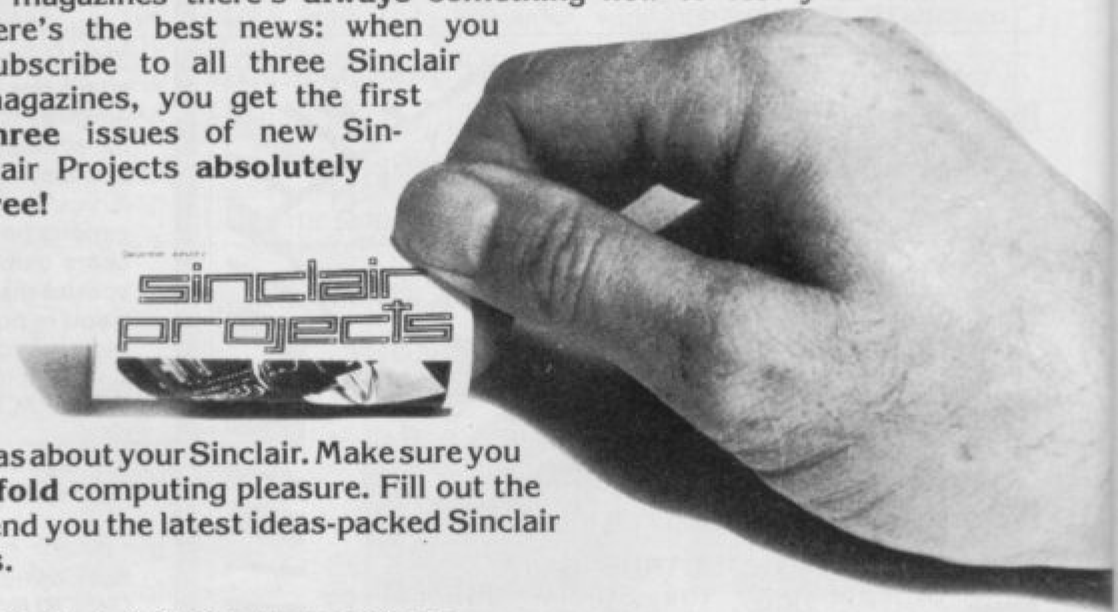
Because we know you're always looking for new ideas to make the most of your Sinclair computer, we're making sure you never run out of steam!

Just announced is our latest magazine for the real enthusiast – **Sinclair Projects** magazine, full of fascinating schemes to tax your skills and reveal the **practical** potential of your Sinclair in applications like controling lights, upgrading computer graphics, household security, and many more.

Whether you're new to computing, or an old hand, you're certain to be an enthusiast. That's why we introduced **Sinclair User** magazine for the latest news, techniques and enhancements to **match** your enthusiasm (now with new 'Spectrum User' supplement!) Next, its companion magazine, **Sinclair Programs**, became an overnight success with 40 NEW programs, ready for you to key, in every issue. Demand was so great that we are now publishing monthly.

Now the exciting new Sinclair Projects completes your store of possibilities with a huge increase in computing potential for you to explore.

Sinclair Projects is published every other month, so with these three magazines there's **always** something new to test your skill. But here's the best news: when you subscribe to all three Sinclair magazines, you get the first **three** issues of new Sinclair Projects **absolutely free!**



We **know** you've got big ideas about your Sinclair. Make sure you live up to them with **threefold** computing pleasure. Fill out the order form now and we'll send you the latest ideas-packed Sinclair Projects – hot off the press.

Mail to: ECC Publications Limited; 30-31 Islington Green, London N1 8BJ

Sinclair User / Spectrum User; Sinclair Programs; Sinclair Projects

Yes – I'd like to subscribe to:

Sinclair User (12 issues – price £11.00)

Sinclair Programs (12 issues – price £13.20)

Sinclair Projects (6 issues – price £6.60) Remember you get the first three issues FREE if subscribing to all three magazines!

I enclose a cheque for £ __________ (deduct £3.30 from total cost if subscribing to all three publications)

Please charge my credit card Card name __________ Number __________

Name __________

Address __________

Signature __________ Date __________

NB This offer applies to UK subscribers only. Overseas rates available on request.

THE **Midland Computer Fair**

Personal computers
Home computing
Small business systems

BINGLEY HALL, BIRMINGHAM
28-30 APRIL 1983

Thurs & Fri 10am – 6pm
Saturday 10am – 5pm

Presented by YOUR COMPUTER **Practical Computing**

This event is the first of its kind in the Midlands, and gives you the opportunity to see and compare the enormous range of personal and home computers, small business systems, microcomputers, software packages, cassettes and scores of the very latest computer games – try them for yourself – decide how much, or how little it takes to build up your own personal computer system.



HOW TO GET THERE

BY RAIL Concessionary rail fares are available direct to New Street Station. Further details are available from, British Rail Travel Centre, New Street Station, Birmngham B2 2QA Tel: 021 643 2711.

BY BUS every few minutes from New Street, Corporation Street, Colmore Row and Bull Ring.

BY CAR Bingley Hall is situated close to the city centre and is within easy access to the M1, M5 and M6. Bingley Hall will be road signed by the AA.

Admission prices – Adults £2.00 Children under 16 and O.A.P.'s £1.00. Party Booking: For groups of over 20 people – adults £1.50 children 75p, (plus a free ticket per 20 sold for the organiser or teacher).

For further information contact.
The Exhibition Manager,
Midland Computer Fair,
Reed Exhibitions,
Surrey House,
Throwley Way,
Sutton, Surrey.
Tel: 01-643 8040

ASTROLOGY

truly AVAILABLE AT YOUR FINGERTIPS

USER PROMPTING PROGRAMS: merely key in birth information as requested by the computer — READ OUT (and/or PRINT OUT) what is normally the result of many hours of painstakingly tedious and complex mathematical calculations using tables, ephemera, etc.

THE SIDEREAL TIME OF BIRTH.
THE ASCENDANT AND MIDHEAVEN in Sign, Degrees, Minutes, and Seconds for EQUAL HOUSE SYSTEM.
THE SIGNS AND POSITIONS OF THE HOUSE CUSPS in Sign, Degrees, and Minutes for the PLACIDEAN SYSTEM.
THE SUN AND MOON POSITIONS in Sign, Degrees. Minutes and Seconds.
ALL THE PLANETS POSITIONS in Sign, Degrees and Minutes. THE LUNAR NODE — THE PART OF FORTUNE — THE VERTEX, AND A HOST OF OTHER BIRTHCHART INFORMATION AT THE TOUCH OF A KEY.

ZX81 16K

ZOCIAC I — ONLY **£10.00**
ZODIAC II — ONLY **£8.00**

GIVES YOU THE ASPECTS AND MIDPOINTS
FOR 48K SPECTRUM AND DRAGON 32

ZODIAC F
Full combined program on one cassette
FOR ONLY **£15.00**

Other programs in course of preparation include: PROGRESSING THE HOROSCOPE; RECTJFICATION OF THE BIRTH TIME, etc.

Send orders with cheque payable to

STELLAR SERVICES
8 FIR TREE VALE, LEEDS LS17 7EY
Tel: (0532) 692770

JOYSTICKS



Compatible software from:-
Abbex Abersoft Axis
Silversoft Quicksilva
New Generation Software
DK 'Tronics and more !!

23.50 INC.VAT & P+P

ZX Spectrum / ZX81

FOR ONE JOYSTICK AND INTERFACE MODULE

BUILT, TESTED & READY FOR USE

- ★ **NO SOLDERING,** interface module plugs into rear connector between ZX and Ram Pack, Printer etc.
- ★ **NO SPECIAL PROGRAMMING,** Joystick 1 simulates cursor movement keys 5 to 8 through interface module.
- ★ **IMMEDIATELY COMPATIBLE WITH ALL SOFTWARE** using the arrow keys for movement.
- ★ **TWO JOYSTICKS** connect via one interface module.
- ★ **EIGHT DIRECTION, SELF CENTRALISING ACTION** with integral 'FIRE' button.
- ★ **FREE 'VIDEO GRAFFITI'** program & full instructions.

IMPORTANT: Use will not invalidate your Sinclair guarantee.

FROM: MR/MRS/MISS
ADDRESS

SEND C.W.O. To: A.G.F. HARDWARE, Dept, SU
26 Van Gogh Place, Bognor Regis, West Sussex PO22 9BY

QTY	ITEM	ITEM PRICE	TOTAL
	JOYSTICK	7.54	
	INTERFACE MODULE	15.96	
ZX Spectrum ☐ ZX81 ☐ Please tick		FINAL TOTAL	

Searching at routine speed

John Gilbert continues his series of articles by looking at retrieving data

IN THE LAST few months I hope you have learned that programming is not an exact science but an art. There are no best ways to program — there are only guidelines. If you can think of a better way of doing something, or improving established methods, do not be worried by the so-called experts. Experts are not always correct.

There are many methods of searching data, just as last month we indicated that there is more than one way of sorting data items. No technique is better than another but in the proper circumstances one technique can be used in favour of another. The Binary Search with which I deal is one of the fastest searching routines and one of the easiest to learn.

Obviously, speed is important in any searching routine. Someone cannot wait for an hour for data contained in a list of 30 items to be retrieved by the computer. If that were the case it would be easier to search through a list on paper.

One method of searching a list would simulate a person doing it by hand very well. That is called the Serial Search — figures one and two — which can take up to half an hour to search a list of 100 names and addresses. The listing in figures two and four will run on the Spectrum but multi-statement lines, such as 2030, will have to be eliminated for use on the ZX-81. The routines will run without the database but if you want to include one of them within the main program you use lines 2000 to 2040.

The computer scans the data list, item by item, trying to match the key, a name or telephone number entered by the user, with the items in internal memory. When a match is made the item will be displayed in full on the screen.

The length of time of the process will depend on the speed of the high-level language, such as Basic, or the speed of the central processor if the program is written in machine code. The number of items in the list to be searched will also be a factor in the amount of time taken by the computer.

Figure 1

SEARCH KEYWORD: Sinclair

STAGE ONE:

→ **Memory aid**
Read Only Memory
Sinclair Research

STAGE TWO:

Memory aid
→ **Read Only Memory**
Sinclair Research

STAGE THREE:

Memory aid
Read Only Memory
→ **Sinclair Research**

SEARCH COMPLETED

Figure 2

```
2000 DIM b$(10,12): REM SET UP E
XAMPLE DATA FILE
2010 FOR k=1 TO 10
2020 INPUT b$(k): REM DATA FILE
ENTRY
2030 NEXT k: PRINT "FILE ENTRY C
OMPLETE": PAUSE 100: CLS
2040 INPUT a$: REM SEARCH KEYWOR
D
2050 LET a=1: REM a=NUMBER OF FI
LE ELEMENT BEING MATCHED
2060 PRINT AT 10,10; FLASH 1;"SE
ARCHING"
2070 IF b$(a)(1 TO LEN a$)=a$ TH
EN GO TO 2110
2080 IF a=5 THEN GO TO 2100
2090 LET a=a+1: GO TO 2070
2100 PRINT AT 10,10; FLASH 1;a$;
" NOT FOUND": STOP
2110 CLS : PRINT AT 12,0; FLASH
1;"ITEM LOCATED"; FLASH 0,b$(a):
 STOP
```



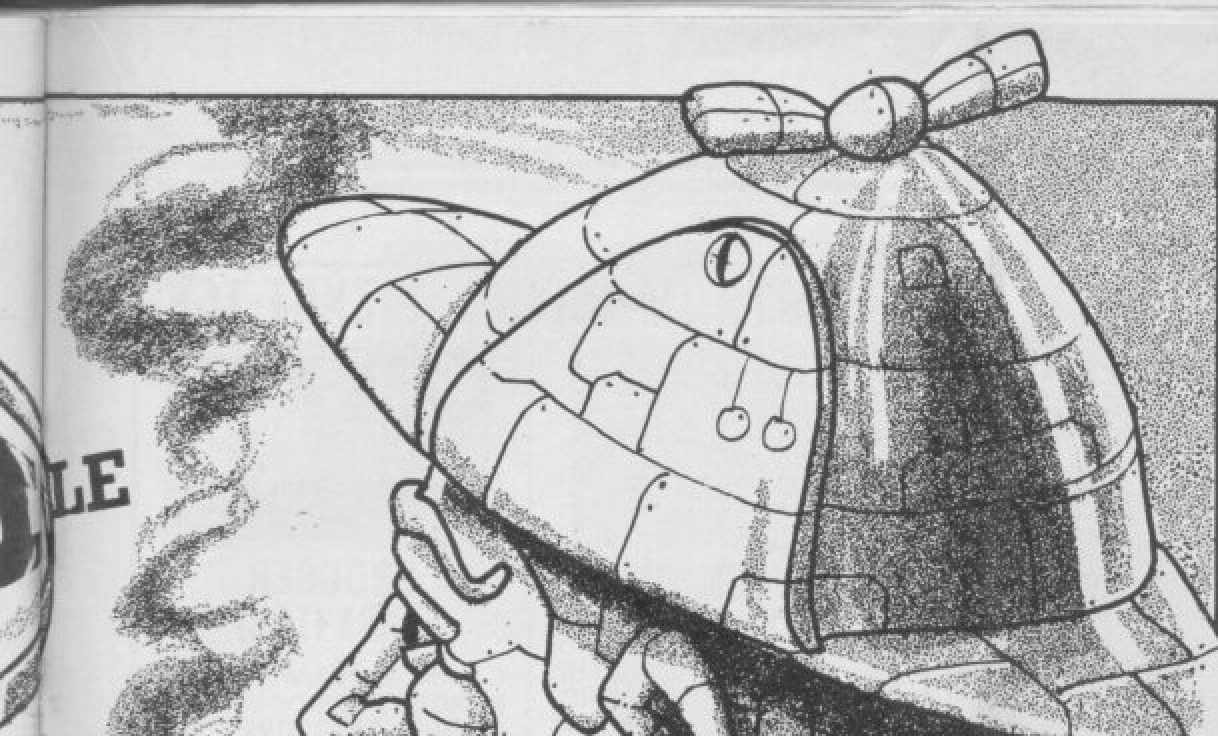
If you are planning to use only a few data items you could use the Serial Search technique. The coding is simple. Use a variable as a counter to point to each data item in the listing in turn. Increase the pointer by one every time an item is compared to the user's entry and no match is made. When the match is made, print it to the screen.

The Binary Search is as easy to program as the Serial Search but the routine is much faster, as it does not have to search every data item on the list. The data must be sorted in alphabetical or numeric order and the computer will look at the element at the centre of the list of data as the starting-point — figure three — cutting the list into two halves.

If the identification keyword or number, typed-in by the user to trace an item in a file, and the element in the file does not match, the computer has to continue its search. The computer will find if the alphabetic character or number is higher or lower than the keyword typed-in by the user. If it is lower the computer will take the last element examined and make that the end of the file, cutting away the other half.

If it is higher, the computer will take the last examined item as the beginning of the new, shorter file. The computer will then find how many elements are in the short file and divide it by two. The number found will be the element at the middle of the file and that is the element looked at next by the computer.

The process continues until a match is



made. Then the computer will print-out the full data item found in the file. The whole process is shown in figure three and a listing of the resulting program is shown in figure four. The listing can be used alone with a short data entry routine or with the database which has been discussed as an example throughout this series.

The listing in figure two includes a short entry routine so that you can test the speed of the Binary Search. Line 30 of the routine will check to see if the keyword entered at line 25 is the same as the element pointed to by variable L in the data file, b/. If it is less than the value of the file entry, the pointer, L, will move further up the list and if it is greater if will move down the list.

That part of the program is executed in lines 30, 40 and 50. The number of the file element in L must be an integer, so INT is used in those lines. The 0.5 at the end of the lines mentioned must be added to the INTeger in L to round it up and not down, as the Sinclair machines do automatically during mathematical operations.

In some cases it is necessary to display every item in a data file which has an entry which corresponds to the keyword input by the user. That can be done by adding an extra condition, IF ... THEN, statement before line 40 so that if a match occurs the program will continue to search the file in case there are more corresponding items. If a long file of data is to be processed and displayed it is a good idea to introduce paging into the display routine.

A list of data must not turn over the end of the screen so that a 'scroll?' message is displayed. The computer should display the data in pages and at the bottom of each page a message to the user should be displayed asking whether he wants to see more. If the user types-in 'no' the program control can be returned to the main menu.

The display of data is an important facet of any program and the guidelines in the second article of this series apply to data output as well as data entry. When a menu is used in a program and is not displayed for some time while other operations are taking place it is important to let the user know what other options are available at that time. That can best be done by displaying a band across the bottom of the screen with the options and the 'return to main menu' option on it.

The main point I want to stress is that not all users are programmers. That may be less so now than in the past with the advent of home computing but there are still some users who have difficulty even getting around the keyboard.

While it is important to know about techniques for file processing, such as those discussed in this and the previous article, it is more important to know about the user interface, i.e., how the user will interact with the computer and how he will cope with your program. Once you can see the likely reaction of the user and fit the program around your intended user, everything else will seem simple.

Next month, in the final article in this series, I will show how to develop techniques for ridding yourself of those little creatures which users do not see but which can make a hash of a program — the bugs.

Figure 3.

SEARCH KEYWORD: Sinclair

STAGE ONE:

```
           Alphabet
           Bubble
---------> Memory
           Research
           Sinclair
           ZX-81
```

STAGE TWO:

```
           Alphabet
           Bubble
           Memory
---------> Research
           Sinclair
           ZX-81
```

STAGE THREE:

```
           Alphabet
           Bubble
           Memory
           Research
---------> Sinclair
           ZX-81
```

SEARCH COMPLETED

Figure 4

```
2000 DIM b$(10,12): REM SET UP E
XAMPLE DATA FILE
2010 FOR k=1 TO 10
2020 INPUT b$(k): REM DATA FILE
ENTRY
2030 NEXT K: PRINT "FILE ENTRY C
OMPLETE": PAUSE 100: CLS
2040 INPUT a$: REM SEARCH KEYWOR
D
2050 LET l=INT (5/2)+0.5
2060 IF b$(l)(1 TO LEN a$)=a$ TH
EN PRINT FLASH 1;"ITEM LOCATED "
; FLASH 0;b$(l): STOP
2070 IF b$(l)(1 TO LEN a$)>a$ TH
EN LET l=INT (l/2)+0.5
2080 IF b$(l)(1 TO LEN a$)<a$ TH
EN LET l=INT (l*2)+0.5
2090 GO TO 2060
```

ZX SPECTRUM & ZX81 EDUCATIONAL SOFTWARE

Spectrum Junior Education £5.50

Use your Spectrum to help your children with their school work. This cassette contains eight attractive, easy-to-use programs for the 7 to 11 age group.

* Topics include English comprehension, spellings, homophones, junior science, maths and history.
* Entering your own questions and answers allows you to adapt two of these programs for exercises in any subject area.
* Moving colour graphics and sound are extensively used to improve motivation.
* Use the "draw" programm to produce pictures, maps and diagrams.

Suitable for the 16K or 48K Spectrum. Program notes are supplied.

O-Level Chemistry (C1) £5.50

This cassette contains four clearly presented revision/tutorial programs. The subject matter has been carefully structured to cover the most important aspects of:

* Elements, compounds and mixtures.
* Structure, bonding and properties.
* Redox, electrolysis and the activity series.
* Acids, bases and salts.

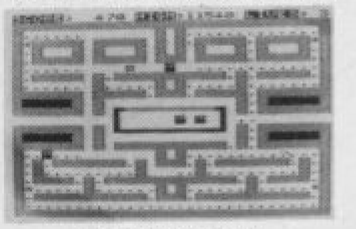
48K Spectrum and 16K ZX81 versions of the cassette are available. Please specify which you require.

Professional Computer Assisted Learning materials from:

CALPAC COMPUTER SOFTWARE
108 Hermitage Woods Crescent, St Johns, Woking, Surrey GU21 1UF.

Overseas orders: £6.50 ($11.60) per cassette; includes AIRMAIL postage.

SPECTRUM 16/48K — ZX81 16K

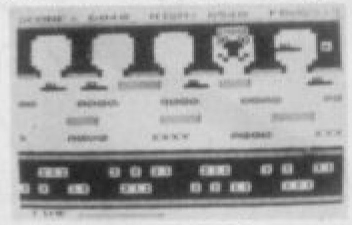


ZUCKMAN ZX81 (16K)

EAT THE DOTS, BEAT THE GHOSTS IN THIS ADDICTIVE GAME. CLEAR THE SCREEN OF DOTS TO EARN A BONUS LIFE AND A FRESH MAZE-FULL OF DOTS. WHEN THE CHASE REVERSES, CATCH A GHOST AND SEE ITS 'EYES' RETURN TO BOX.

* ALL MACHINE CODE (10K)
* AUTHENTIC ARCADE ACTION
* HIGH-SCORE 'HALL OF FAME'
* TITLE/DISPLAY ATTRACT MODE

ONLY £5.95 INC P&P



FROGGER ZX81 (16K)

GUIDE YOUR FROG ACROSS THE ROAD, THEN CROSS THE RIVER BY JUMPING ONTO TURTLES AND LOGS, TO REACH SAFETY IN A FROG-HOME. FILL ALL FIVE FROG-HOMES TO EARN A NEW 'SCREEN' WITH MORE HAZARDS.

* MOVING CARS, LOGS, TURTLES
* ALLIGATORS, DIVING TURTLES
* SAVE BABY FROG FOR BONUS
* ALL MACHINE CODE (13.5K)

ONLY £5.95 INC P&P

SPECTRUM 16/48K VERSIONS AVAILABLE SAME PRICE*
(NB: Photographs show ZX81 versions)

DJL SOFTWARE

9 TWEED CLOSE, SWINDON, WILTS SN2 3PU
TRADE ENQUIRIES WELCOME

MICROWARE Leicester — THE FRIENDLY TO USER STORE

SUPER SOFTWARE CLUB

MEMBERSHIP INCLUDES: **20% OFF FIRST TAPE**
15% OFF NEXT THREE TAPES.
10% OFF ALL FUTURE TAPES AS MEMBER

★ Special offers ★ Forthcoming free offers ★ Occasional special hardware offers ★ Regular Newsletter ★ Only the best software stocked

ZX81 · SPECTRUM · DRAGON 32 · ORIC 1 · JUPITER ACE · B.B.C.

TWO SCHEMES

★ MAIL ORDER MEMBERSHIP: **£8.00** ★ SHOP MEMBERSHIP: **£5.00**
★ OPTIONAL LIFE MEMBERSHIP **£5.00** EXTRA ★ SPECIAL SCHEMES FOR 15-YEARS-OLD AND UNDER ★ O.A.P.s ★ UNEMPLOYED. TELEPHONE ACCESS/BARCLAYCARD/VISA ACCEPTED OR S.A.E. FOR FULL DETAILS.

FREE DRAW FOR JUPITER ACE COMPUTER ON APRIL 30th FOR ALL MEMBERS!

You know us! We are genuine! Full refund of fee if not satisfied when membership details arrive or anytime in first six months if genuine complaint is not resolved within 30 days.

5 ST. PETERS LANE,
LEICESTER. TEL: 0533 29023

"THE FRIENDLY TO USER" STORE
Pop-in to the shop and have a chat about the club if you wish — no obligation.

THE "FRIENDLY TO USER STORE"

THE FIRST MIDLANDS REGION SHOP SPECIALISING IN **SINCLAIR COMPUTER** ACCESSORIES AND HOME COMPUTING GENERALLY.

STOCKING: SINCLAIR ZX81 and SPECTRUM, DRAGON 32, ORIC 1 and JUPITER ACE.
FULL RANGE OF HARDWARE and SOFTWARE.

Possibly the widest range of software available in the Midlands. BBC software now available!

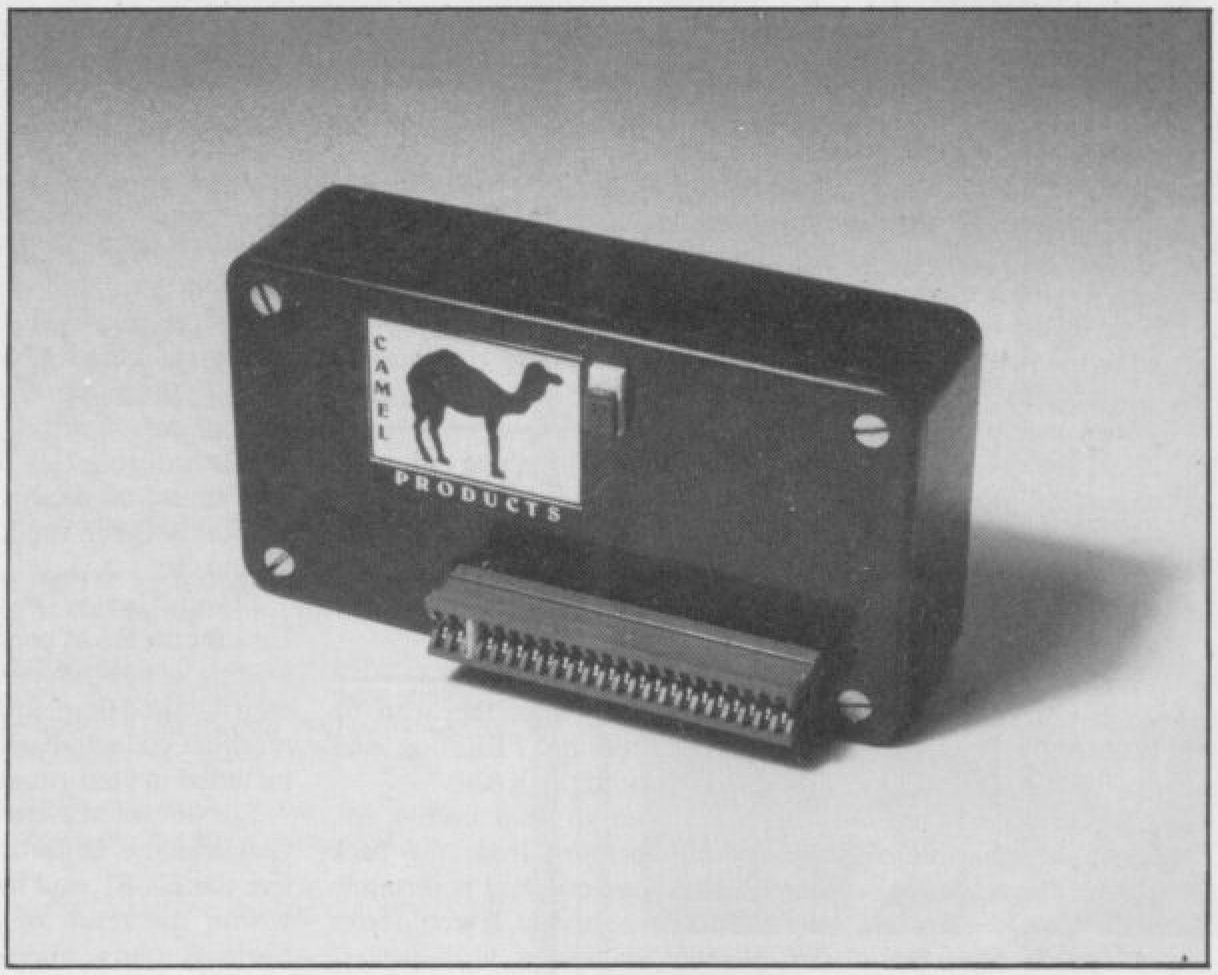
SPECIAL MICROWARE'S OWN SOFTWARE FOR THE ZX SPECTRUM.
ALIEN COMMAND 16/48K SPECTRUM **ONLY £4.75**
BACKGAMMON 16/48K SPECTRUM **ONLY £4.50**
YAHTZEE 16/48K SPECTRUM **ONLY £4.50**
Please include 50p post & packaging with software orders.

SEE US AT THE **MIDLAND COMPUTER FAIR** BINGLEY HALL BIRMINGHAM, 28-30 APRIL AND **MICROSCENE** SHEFFIELD, 16th APRIL

Sorry, we don't sell: stationery, cameras, hi-fi, TVs, cosmetics or pills, only home computers and accessories!

5 ST. PETERS LANE LEICESTER TEL: 0533 29023
Open 9.30-5.30 closed Monday
SEND S.A.E. FOR FURTHER DETAILS

MICROWARE Leicester — THE FRIENDLY TO USER STORE



Battery-backed RAM for micros is here at last. Stephen Adams finds it cheap at the price.

Permanent memory from the magic Memic

WITH RECENT developments in battery and memory technology it is possible to keep the memory of a computer intact without having to store it on disc or tape. The Memic 81 is one such system which keeps the memory supplied with sufficient power to preserve its data, even when the power to the computer is turned off. That allows you to have the ease of use of RAM with the permanency of ROM.

The Memic 81.2 contains one or two 2K RAM chips — 6116 CMOS RAM types. That memory is addressed into the ROM reflection area from 8K-16K on the ZX-81 memory map. The address at which each chip appears can be adjusted to any 2K section within that area by two plugs inside the unit.

The RAM chips are made in CMOS and take a very small amount of power when not being addressed or passing data. Being a static memory it also requires no refreshing of the chip every few milliseconds like the dynamic chips used in the Sinclair 16K RAM pack.

It is those two factors which go a long way to making it a non-volatile memory, i.e., it does not lose it data when the power is switched off. The chips still require power to preserve the data, although it is very small.

There is a lithium battery included in the unit which provides a back-up power supply of 3.5V while the power to the computer is switched off. When the computer power is switched on that takes over from the battery, but does not re-charge it, and the RAM can be used to input and output data. While it is under battery operation that cannot be done, as the supply voltage is too low.

Until now battery-backed memory has been very expensive and available only for mainframes or minicomputers. Cambridge Microelectronics is the first to provide battery-backed systems for microcomputers. The Memic 81-2 is in a small black plastic box 4⅔. in x 2⅔in. x 1⅔in. and it plugs into the edge connector before a 16K RAM pack and after the printer. There is a switch on the front of the box which must not be touched until there is power on the computer, as it transfers control from battery to computer-powered operation.

To use the data stored in the RAM pack the switch must be moved up when you see the cursor on the screen. To keep the data intact when switching off the system, push down the switch before pulling out the plug. If you have to re-set the computer at any time, push down the switch first.

When the switch is down the unit effectively is isolated from the computer and other devices can be used in its place. The edge connector is a fairly stiff fit and so no RAM pack wobble should be experienced with the Memic; as the edge

continued on page 86

continued from page 85

experienced with the Memic; as the edge connector for the 16K RAM pack or other extension is inside the case, it also looks very neat.

The case has four large slotted screws which allows you to get inside the unit to adjust the address plugs — which can be done when the power is off without affecting the data held in the RAM — to replace the battery. The battery is a long yellow tube which is held securely by two clips and a stricky strip. That, according to Cambridge Electronics, will last approximately 10 years, so you will not need to do it often.

The Memic arrives well-packed and with a detailed description of how to use it, plus listings of programs which are included inside the RAM pack. Inside the RAM pack are two programs, one a machine code loader to transfer the Basic program into a 16K RAM pack and the other a demonstration program which will do the matrix calculations necessary to cost coloured labels.

All that is required is to throw up the switch after seeing the cursor and write PRINT USR 8334 and the program is loaded automatically into the Basic program area, complete with variables if necessary. The machine code routine which does that is listed and explained in the instructions and consists of only 12 bytes. Another 12 bytes of machine code routine is provided so that the RAM pack may be loaded with up to 4K of program, assuming you have 4K in the Memic, or data.

Both routines can be altered to save any part of memory in the RAM pack. The RAM pack can be switched off at any time to protect the program or data from being corrupted or it can be used to store machine code routines for running via the USR command. Being in RAM and not EPROM means that they can be altered and edited by PEEKing and POKEing bytes into the RAM.

'Its price puts it well within the reach of the personal and business user'

The time taken to load even a 4K program into memory from the pack takes less than a second and is certainly faster than any tape or disc. It would have been pleasant to see a write-protect switch on the RAM pack, as it would have meant that if you were running a machine code routine in the RAM that it could not be corrupted by crashing the computer.

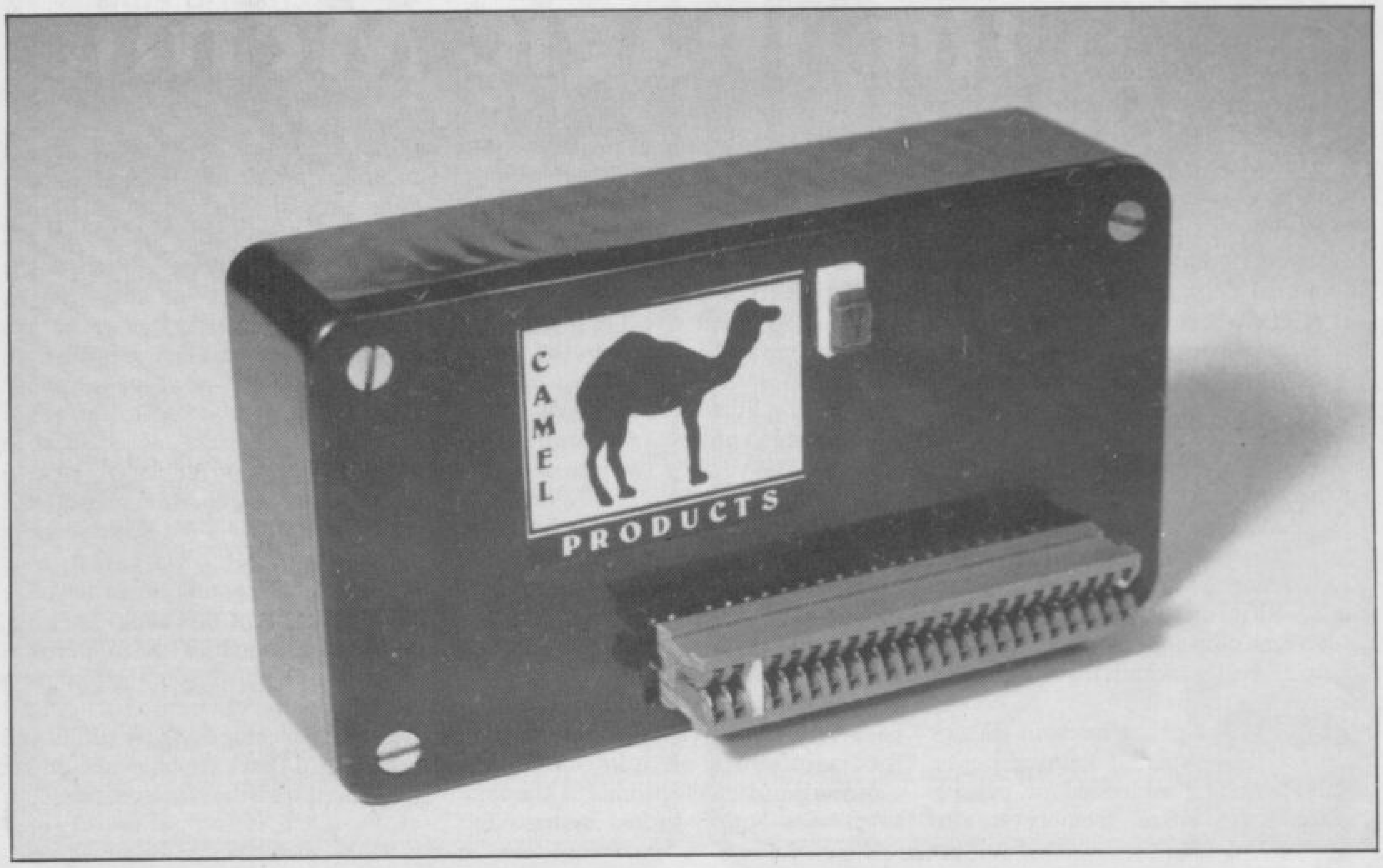
If more memory than 4K is required, Cambridge does a 16K battery-backed RAM pack which is software-switchable, or you could stack together several Memics and switch them on one at a time.

Using this type of RAM pack it can give you portable software, as it can be transferred from one machine to another if the power is turned off before connecting or disconnecting the RAM pack. You can then take the program contained in the RAM pack ready to run and fit it to a friend's machine. Transferring data from the ZX-81 to the Spectrum using this method will work. You must, of course, use a Spectrum adaptor between the RAM pack and the Spectrum.

The unit is very simple and easy to use. Uses for the RAM pack are a quick way of loading a program, storing frequently-used data and frequently-used routines — machine code or Basic — which can be included in your programs.

The life of the battery predicted by Cambridge is fantastic, as it should outlive the ZX-81, and its price puts it well within the reach of the personal and business user of microcomputers.

The Memic 81 with 2K of RAM costs £28.70 and the 4K version £34.45; both prices include the battery and VAT. Cambridge Microelectronics also does other battery-backed RAM for other computers and is at 1 Milton Road, Cambridge CB4 1UY. Tel: 0223 314814.



SINCLAIR OWNERS READ THIS FROM OCP

You've probably heard about MACHINE CODED PROGRAMS and thought "so what! How can they help me?"

Well now you can find out and taste the very real difference by purchasing our latest MACHINE CODED application program. This emulates features of the most modern professional computers (12 years writing machine coded programs for IBM, ICL, UNIVAC and Sinclair means we know what we're talking about).

Just read the specification and you'll see what we mean.

ADDRESS MANAGER.....

Works on the 16K and 48K Spectrum, in 48K it will store, file, select and retrieve over 400 full addresses (over 1500 individual names); Dynamic Memory Management and compression techniques makes all this possible and there's a lot more:

- **FULL SCREEN INPUT and EDITING** — see it as a page as it happens with insert, delete and TAB Commands.
- **MULTIPLE INDEXING** — 3 way user-defined index enables you to define, catalogue, select and print entries as needed, (essential for the more sophisticated applications.)
- **INSTANT RESPONSE** — yes, this program is very very fast.
- **SUPER FRIENDLY** — crash-proof, extremely easy to use and efficient in a way that BASIC can never be.

MANY USES

- **AT HOME** — (storing addresses, printing out Xmas Card lists etc.)
- **AT WORK** — for mail-order work, internal telephone directory, sorting customers into types, areas, size . . . you choose.
- **CLUBS** — print-out members list, sort different categories etc.

This program contains over 3000 MACHINE CODE instructions, yet uses little valuable memory space . . . a very powerful recommendation.

OR IF YOU WANT TO WRITE YOUR OWN MACHINE CODE PROGRAM

MACHINE CODE TEST TOOL

The ultimate professional tutor and de-bug program, we wrote this to help us write our own programs.

- **TEST** and display machine code instructions as they're written.
- **IDEAL** for both the novice and the expert.
- **FULLY** documented with a 32 page tutorial
- **HEX:DECIMAL** conversion as standard.
- **CHARACTER GENERATOR** — of unbelievable quality!!! supplied free with the Spectrum version.

Available for the 16K ZX81 and 16/48K Spectrum. If you're looking to write machine code this is THE program, we know we use it ourselves.

MACHINE CODE..IT MAKES ALL THE DIFFERENCE.....

Post order to: Oxford Computer Publishing Ltd., P.O. Box 99, Oxford.

Please rush me: ADDRESS MANAGER at £8.95 each. ☐ Spectrum only.

MACHINE CODE TEST TOOL at £9.95 each.

Tick box for edition required: ☐ ZX81 ☐ Spectrum

Send cheque, postal order or ACCESS No. to above address. Or telephone order with ACCESS No. to (0753) 888866 (Ansaphone available)

NAME: ....

ADDRESS: ....

.... POSTCODE: ....

ACCESS Card No. ....

J. K. GREYE ENTERPRISES LTD



... is a new company, from J.K. Greye, set up specifically to bring you High Quality/Low Cost games for your Sinclair ZX Spectrum.

THE
ARCADIAN
4 Games plus Menu

for the 16/48k SINCLAIR ZX SPECTRUM

only £4.95 incl.

includes

Invasion · Kamikaze
Minefield · UFO

Games as sold elsewhere for £5 + each, why pay more for less, when you can get all four for the price of one!

The **ARCADIAN**
includes games to suit all ages, from 5 to 105

INVASION: Our version of the Classic Arcade Game, surely one of the best around. Includes Full Colour High Res. Graphics, Sound and it's incredibly fast at the end.

KAMIKAZE: If you like Scramble, you'll love this. 16 levels (long ones at that), of tortuously twisting caverns, Missiles, Starmines (which move in between games, so it's never the same next time around), Bases, Fuel Dumps (watch you don't run out of fuel!), and two speeds (difficult and impossible). Definitely a game for those amongst you with a suicidal tendency, when playing games, because you can score even when you crash! (If you can make it past level 8, write and let us know, 'cause that's as far as we've managed!).

MINEFIELD: A totally new game, in which you have to lay mines in a forest. Sounds simple doesn't it? But, once you start, you can't stop and there lies the rub (or to be more exact the explosion!). Guaranteed to get your fingers in a twist!

UFO: Dodge the Asteriods, blast the Alien Craft and work off your aggressive instincts on the keyboard. Gets progressively more difficult the longer you last!

All of these for only £4.95, can you afford to miss out on this one!

Send your order to **J.K. GREYE ENTERPRISES LTD**
16 PARK STREET, BATH BA1 2TE.

Please send me.......copies of "**The ARCADIAN**" at **£4.95** each, to: Name..........................

Address..........................

.... Postcode..............

I enclose a cheque/P.O. for £..................

made payable to **J.K. GREYE ENTERPRISES LTD.**

All Software sold subject to the condition that Hiring, Lending, Unauthorised Copying or Resale is Strictly Prohibited.

TRADE & EXPORT ENQUIRIES WELCOME

PROGRAMMERS! Do you think you can write brilliant games Software for the Spectrum?
If so, contact us and we'll market it for you. If you don't think your games are the best around, try the other Software Houses, because we will only sell the best!

M.C. LOTHLORIEN

— Britain's leading wargames software house



PRESENTS

•ROMAN EMPIRE!
(16K ZX81 £4.50)
(SPECTRUM £5.50)

•TYRANT OF ATHENS!
(16K ZX81 £4.50)
(SPECTRUM £5.50)

•SAMURAI WARRIOR!
(16K ZX81 £4.50)
(SPECTRUM £5.50)

•PELOPONNESIAN WAR!
(16K ZX81 £4.50)

•WARLORD!
(16K ZX81 £4.50)

Hours of challenging entertainment for all the family.

WARNING!

these games can be addictive

Cheques or PO's please — made payable to:

M.C. LOTHLORIEN
4 Granby Road, Cheadle Hulme, Cheshire SK8 6LS
or available from most good software shops

ZX-81 (16K) MAP ASSISTED COMPUTER WARGAMING

Historically accurate simulations

CARRIER STRIKE £9.50

Compete against the computer. As commander of the American Carrier forces can you provide a decisive victory in and around the Eastern Solomons during 1942.

The computer controls all movement of ships and aircraft on the map.

Colour map and full instructions included.

Cheque of P.O. made payable to:

K W SOFTWARE
155 Ringinglow Rd, Sheffield S11 7PS.

D J MOODY COMPUTER SOFTWARE

GAMES

NEW

ADVENTURE SERIES.............. All £5.00
The Series.................................. £16.00

For the 16K ZX81 and ZX Spectrum. These Adventures are linked together using data storage above RAMTOP. All can be played independantly of the others. You must complete certain tasks to continue to next Adventure.

ADVENTURE-1. 100 caves, 50 treasures, ghosts, a magician, goblins and trolls all out to get you. Graphic display. Half-a-mo.

ADVENTURE-2. Deep sea adventure with 30 wrecks, 50 treasures, Jelly fish, octopus and sharks, Graphic display. Half-a-mo.

ADVENTURE-3. Land based adventure with 50 locations, 70 treasures, ghosts, vampires, monsters, snakes, Father Christmas and his elves. Graphic display. Half-a-mo.

ADVENTURE-4. Space adventure with 30 stars and planets to visit, 70 treasures, Alien starships, pirates etc. Graphic display. Half-a-mo.

Note: Half-a-mo is our save game feature for stopping a game while playing and returning to same position upon reloading.

BUSINESS USERS

If you use a ZX81 or ZX Spectrum for business purposes or would like to do so then contact us for help and advice on setting up or complementing your hardware or software systems.
Mark your enquiry Dept. Business.

PRIVATE USERS

If you have a need for a program but cannot or do not wish to write it yourself then contact us. We will write programs for the ZX81 or the ZX Spectrum, mainly in BASIC but some machine code can be written.
Charges are on a length of time to complete basis.
Mark your enquiry Dept. Private.

ORDERING

State ZX81 or ZX Spectrum (Minimum RAM 16K) Please state your name and address CLEARLY on your order.
Cheques payable to:
D J MOODY COMPUTER SOFTWARE
Prices include VAT. P + P is free.
6 month guarantee on all products.
Send your order to:
Dept SU,
1 Starnhill Cottages, Bingham,
Notts NG13 8DH.

UTILITIES

AS/DIS. Hex assembler and disassembler for the machine code user. 5000 bytes reserved. Functions: Hex load assembles hex code. Hex dump disassembles code. Hex clear clears parts of memory. Hex save saves named program............................ **£5.00**

CASSETTE DESIGN. To help you store your own tapes this program will use the ZX Printer to print your own designs. These are used as inlay cards. It will store up to 10 designs. Save routine...................... **£5.00**

WORD SQUARER. This program will help you solve word squares such as the one in Computing Today, September. Max. dimensions are 20×30 characters. Searches N, S, E, W, NE, NW, SE, SW. Save routine **£5.00**

DISASSEMBLER. Decodes bytes in memory to Z80A mnemonics. All shifts calculated correctly. A very handy tool...... **£5.00**

ASSEMBLER. Type in normal Z80A mnemonics and this program will turn them into their codes and load them into memory. Full editing facilities........................ **£5.00**

METRIC CONVERTER. Main converting section will convert Length, Area, Volume, Velocity and Mass. Gives table printout. Hundreds of conversions possible..... **£5.00**

DATA FILE. The newest and most flexible Date filing system yet. Any memory size. Files any length, 20 zones within a file. Functions: Find file, Delete file, Amend file, Search file x zone y for X$ Swap file, Lprint file, Alphabetical ordering Inverted ordering. The best at only.. **£5.00**

Andrew Hewson answers more of your queries and problems

Educational difficulties

A QUESTION often posed by those writing an educational program who have incorporated a number of problems into their program and want to present, say, half of them in one session, is asked by Steven Maltby of Northampton. **How do you tell the ZX-81 to think of five random whole numbers between 1 and 10 without the risk of repetition?**

The obvious answer to his question is a routine of the form:

```
10 DIM A(5)
20 LET A(1)=1+INT(RND*10)
30 PRINT A(1);"";
40 FOR I=2 TO 5
50 LET R=1+INT(RND10)
60 FOR J=1 TO I-1
70 IF A(J)=R THEN GOTO 50
80 NEXT J
90 LET A(I)=R
100 PRINT A(I);"";
110 NEXT I
```

Array A is used to store each selection and if a repetition arises it is discarded and a fresh random number is drawn. The routine works well for small samples but becomes progressively slower if the number of samples is increased.

To see the effect, try changing lines 10, 20, 40 and 50 as follows, to simulate the effect of drawing all 52 cards from a pack in random order:

```
10 DIM A(52)
20 LET A(1)=1+INT(RND*52)
40 FOR I=2 TO 52
50 LET R=1+INT(RND*52)
```

Each selection tends to take longer than the previous one because the chance of choosing a number which has appeared previously increases. In choosing the final number, the ZX-81 must select the correct number out of 52 possibilities, which can take a very long time.

A much more elegant solution is to use a routine which mimics the act of shuffling a pack of cards, i.e., create an array containing all 52 possibilities in order and then randomise the location of each element of the array in turn. A suitable routine of this form for Maltby's problem is:

```
10 DIM A(10)
20 FOR I=1 TO 10
30 LET A(I)=I
40 NEXT I
50 FOR I=1 TO 10
60 LET R=1+INT(RND*10)
70 LET S=A(R)
80 LET A(R)=A(I)
90 LET A(I)=S
100 NEXT I
110 FOR I=1 TO 5
120 PRINT A(I)
130 NEXT I
```

Lines 10 to 40 set up the array, lines 50 to 100 swop each element in turn with another element selected at random — the equivalent of shuffling cards — and lines 110 to 130 PRINT the first five elements of the randomised array.

Several readers, including Nicholas Kennedy of Belfast, Geoffrey Hulme of Stoke, and Gareth Rieley of Nottingham, are interested in adding RAM to their



ZX-81s or Spectrums. They ask questions like: **What are the advantages and problems of using a 64K RAM on the ZX-81? Can 16K Spectrum programs be loaded into the 48K machine? Can 16K ZX-81 RAMs be used on the Spectrum? Why is there a difference in price between add-on RAMs for the Model One and Model Two Spectrums?**

In the face of such a barrage I contacted Stephen Adams, who specialises in dismantling Sinclair computers for fun, for the latest information. Most people know that 64K of total memory — i.e., ROM and RAM — is the most which can be used with the Z-80 microprocessor without special paging facilities. In the ZX-81 the bottom 8K of memory is reserved for the ROM — the set of machine code instructions which give the machine its character. In the unexpanded machine the next 8K is absent and then there is 1K of RAM at addresses 16K to 17K.

When a 16K RAM pack is added it displaces the 1K of RAM to occupy addresses 16K to 32K. The implication of that design is that Sinclair intended originally to release a new ROM with enhanced facilities to occupy addresses 0 to 16K.

In fact, it has never done so but other manufacturers have stepped in to fill the gap with graphics units and assemblers; 16K and 32K memories are also available which occupy addresses 16K to 32K and 16K to 48K respectively.

In either case, all the extra memory is available directly to the Basic system; 64K RAMs are available of which 48K lies between addresses 16K and 64K and is available for normal use. Another 8K replaces the "missing" 8K of ROM but that part of memory can be PEEKed and POKEd only from Basic. The final 8K is present but unused, which means presumably that the manufacturer also has some future application in mind.

The memory situation for the Spectrum is equally complicated but for rather different reasons. In this machine the ROM occupies 0 to 16K and the standard 16K RAM occupies the remaining area up to 32K. The easiest way to add more memory is to return the machine to Sinclair with a suitable cheque and it will do the job, but that means doing without your machine for a time.

Add-on memory is available from other manufacturers but Sinclair has re-designed the circuit board completely since its original launch and so it is necessary to determine whether your machine is an early version — model one or a re-designed version — model two.

Most model one machines have grey keys, whereas model two has light blue keys. To be certain which model you have you should look into the machine through the slot in the rear where the edge connector is situated. If you have a 16K model one you will see a vacant 16-pin socket on the printed circuit board lying to the left of the slot and about two centimetres from the rear of the machine. If your machine is a 48K model one the 16-pin socket will not be vacant but will

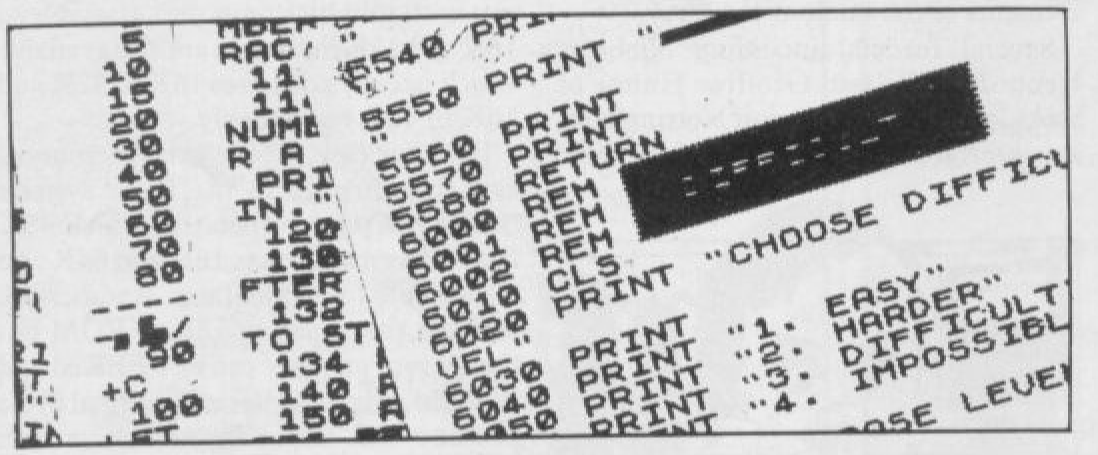
Continued on page 90

Continued from page 89

act as the connector between the main printed circuit board and a subsidiary board on which the extra memory and decoding chips are mounted.

In that case you will also see seven circular capacitors, each rather smaller than a halfpenny piece, mounted on the subsidiary board in a line facing the rear of the machine.

The 16-pin socket is not present on the model two because there is space available on the re-designed main printed circuit board for the extra memory and decoding chips. Instead, the very large Z-80 microprocessor chip is clearly visible through the slot, lying approximately below the 9 key on the keyboard.



The reason for the price difference for add-on memory between model one and model two machines is apparent. To extend a model one the necessary chips must be mounted on a suitable board to be located above the main board. To extend a model two the necessary chips need only to inserted in the sockets already provided on the main board.

It is not possible to plug a ZX-81 RAM pack directly into a Spectrum, although at least one company now markets a small adaptor to allow you to do so, thus giving 32K of RAM with a 16K ZX-81 RAM pack or 48K of RAM with a 64K ZX-81 RAM pack.

Programs written for a 16K or 32K Spectrum should work without modification on the 48K machine and it is safe to assume that all 16K programs available commercially will run on the larger machines. Of course, the converse is not true; it is most unlikely that a program written for 48K would function on a smaller machine.

Alan Baker of Fareham asks: **Would you advise using a flexible ribbon connector instead of plugging a RAM pack directly into the user port?**

A ribbon connector can be used provided it is short, say, 3in. or 4in. long. I know several people who have used such a connector to alleviate the well-known ZX-81 wobble problem.

Simon Boyes of Stairbridge has a Spectrum. He asks: **Is it possible to generate multi-coloured single characters?** The simple answer is no. The Spectrum allows one PAPER and one INK colour only per character position. The only way to obtain the illusion of a third colour at a single location is to PRINT first one character and then a second character alternately, using different INK andor PAPER values in each PRINT statement. The following routine illustrates the method:

```
10 PRINT AT 0,0;INK 1; "TTTTTT"
20 PRINT AT 0, 0;INK4;"XXXXXX"
30 GOTO 10
```

The effect is not particularly convincing, because the display appears to blink. If the characters are made to move the eye is distracted from the blinking by the movement. Thus with a little ingenuity characters in different INK colours can be made to appear to occupy the same location and move through one another.

The easiest way to generate the illusion is to rotate user-defined graphics characters bit by bit, rePRINTing the characters after each rotation. Table one shows a machine code routine which rotates the A and B characters to the right and the C and D characters to the left. After eight calls to the routine the A character has been moved to the position occupied previously by B. The B character, in turn, has been moved to the right and then wrapped around to occupy the position previously taken by A.

The second half of the routine works in a similar fashion to move the D character to the left and to wrap around the C character. The routine can be loaded into memory using a loader program such as:

```
10 FOR i=23296 TO 23345
20 INPUT j
30 PRINT i,j
40 POKE i,j
50 NEXT
```

Run the program and enter each of the decimal numbers in the left-hand column



in turn. The machine code routine will be loaded into the printer buffer starting at address 23296. The effect of the routine can be assessed by a loop of the form:

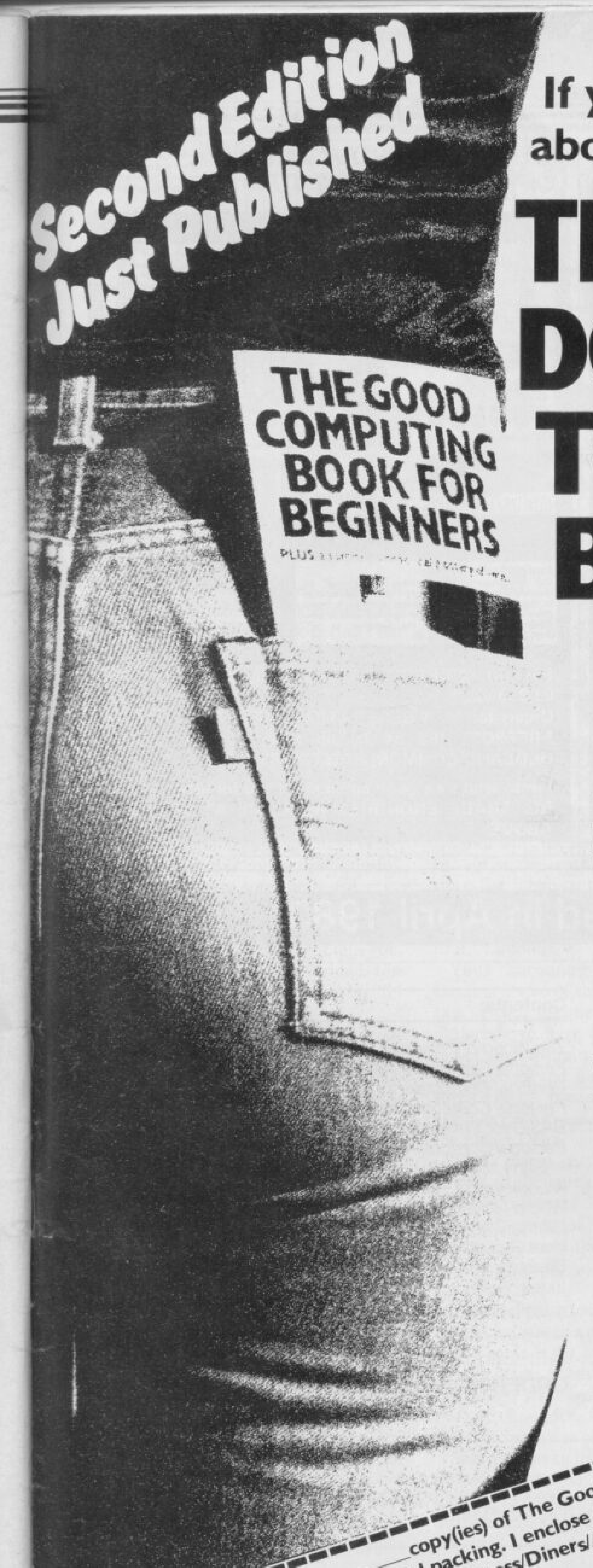
```
10 PAPER 0: BORDER 0
20 CLS
30 PRINT AT 0,0;INK2; "AB AB AB
   AB AB AB AB AB"
40 PRINT AT 0,0;INK4; "CD CD CD
   CD CD CD CD CD"
50 RANDOMISE USR 23296
60 GOTO 30
```

The PRINTed letters, ABCD, must be graphics characters selected by pressing SHIFT 9 at the beginning and end of each string.

- *Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.*

Table 1 — Routine to rotate A to B and D to C.

Decimal	Assembler	Comment
42, 123, 92	ld hl, (23675)	Point de
84	ld d,h	and hl
93	ld e,l	to A
1, 8, 0	ld bc,8	A and B
9	add hl,bc	
65	ld b,c	
26	ld a,(de)	Next byte
78	ld c,(hl)	of each
203, 47	sra a	Rotate
203, 25	rr c	right
203, 23	rl a	
203, 15	rrc a	
18	ld (de),a	Save bytes
113	ld (hl),c	
19	inc de	
35	inc hl	
16, 240	djnz,-16	Again
84	ld d,h	Point de
93	ld e,l	and hl
1, 8, 0	ld bc,8	to
9	add hl, bc	C and D
65	ld b,c	
26	ld a,(de)	Next byte
78	ld c,(hl)	of each
203, 39	sla a	Rotate
203, 17	rl c	Left
203, 31	rr a	
203, 7	rlc a	
18	ld (de),a	Save bytes
113	ld (hl),c	
19	inc de	
35	inc hl	
16, 240	djnz,-16	Again
201	ret	



If you want to know about computing . . .

THE FACTS DON'T HAVE TO BE BORING!

An entertaining, but **thorough** reference source with the most readable, comprehensive glossary you'll find anywhere. The Good Computing Book for Beginners is an essential A-Z of all the facts you need to know about computing — and none you don't!

Whether you're brand new to computing, or an old hand keen to stay ahead, you'll score by keeping this classic, top-selling book within reach to use again and again.

The author, Dennis Jarrett, is a successful journalist who was also founder editor of Which Computer? magazine — so his first edition quickly became a standard work. Now this new, substantially enlarged and revised edition covers the latest trends, terms and technology with the relevant facts — and ONLY the relevant facts — in **plain English.**

Here's another fact you'll find fascinating: **it will only cost you £2.95!**

Use the coupon below to get your copy right away — or buy it soon from your bookshop. It's the no-nonsense book you'll turn to again and again.

Please send me ______ copy(ies) of The Good Computing Book for Beginners by Dennis Jarrett at £2.95 plus 50p post and packing. I enclose a cheque for ______ / Please debit my credit card account Visa/Access/Diners/Amex number ______

Signature ______

Name ______ Address ______ (please print clearly)

Send to: ECC PUBLICATIONS LIMITED 30-31 Islington Green London N1 8BJ

SOUND with SINCLAIR

MAKE AMAZING SOUND EFFECTS WITH YOUR ZX 81, TIMEX Sinclair 1000 or SPECTRUM



THE ZON X
£25.95
incl p&p & V.A.T



- The ZON X SOUND UNIT is completely self-contained and especially designed for use with the ZX81, TIMEX Sinclair 1000 and Spectrum Computers. It just plugs in — no dismantling or soldering.
- No power pack, batteries, leads or other extras.*
- Manual Volume Control on panel — ample volume from built-in loud-speaker.
- Standard Sinclair — 16K Rampack or printer can be plugged into ZON X Sound Unit without affecting normal computer operation.
- Huge range of possible sounds for Games, Music, Helicopters, Sci-Fi, Space Invaders, Explosions, Gun-shots, Drums, Planes, Lasers, Organs, Bells, Tunes, Chords, etc., or whatever you devise!
- 8 full octaves. Uses 3-Channel sound chip giving programme control of pitch, volume of tones and noise, all with envelope control.
- Easily added to existing games or programmes using a few simple "BASIC" lines or machine code.
- No memory addresses used — I.O. mapped.

FULL instructions with many examples of how to obtain effects and the programmes, supplied. Fully guaranteed. British Made.

**Except with Spectrum you need the Spectrum Extension Board Order No. SE1 — Price £6.80 incl. V.A.T.*

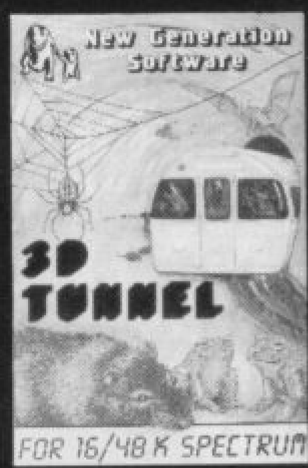
Payment may be made by Cheque. PO Giro No. 388 7006. Postal Order or Credit Card.
Export orders: — Bank Cheque. International Money Order. U.S. $ or £ Sterling.

BI-PAK Dept. SU4, PO Box 6, 63A High Street, Ware, Herts.

Access & VISA accepted. Ring 0920 3182 for immediate despatch.

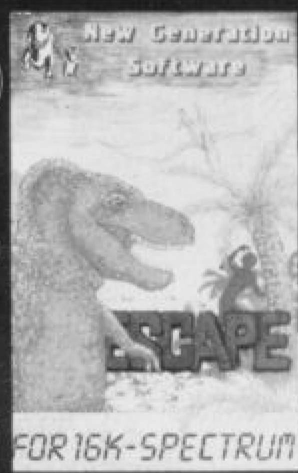
New Generation Software

From M. E. Evans the author of the highly acclaimed 3D MONSTER MAZE and 3D DEFENDER



3D TUNNEL (16K & 48K Versions on one tape)
What lies in the depths of the tunnel? Flapping bats, leaping toads, scurrying rats, crawling spiders, all appear live in the 3D TUNNEL as it weaves about. We leave the last object to your imagination. (Not in 16K version). Price £5.95, special introductory offer at £4.95 until February 28th.

TWO 3D GAMES FOR THE SPECTRUM



ESCAPE (requires only 16K)
Can you eascape from the dinosaur infested maze? 3D grandstand view provides dinosaurs with the opportunity to hide behind the hedges or to soar over them to swoop down on you. "One of the best and most original games we have seen for the Spectrum so far". SINCLAIR USER. Price £4.95

For instant CREDIT CARD Sales by phone only ring 01-930-9232
Orders to: NEW GENERATION SOFTWARE dept SU FREEPOST (BS 3433) (no stamp required in UK) OLDLAND COMMON, BRISTOL BS15 6BR

Please send s.a.e. with all enquires and for lists of stockists. TRADE ENQUIRIES WELCOME AT ADDRESS ABOVE.

To be published in April 1983

NEWNES BOOK OF PERSONAL COMPUTING

Edited by **Philip Chapman**

- Written by a team of well known writers
- A non-technical introduction for the layman
- Well illustrated

Whether you are interested in personal computing for education, business or hobby — or whether you simply want to know what all the fuss is about! — *Newnes Book of Personal Computing* will lead you gently through the micro minefield.

The book has been specially written for those with no previous technical knowledge and aims to introduce you to the fascinating world of personal computing in a readable and friendly way.

Personal computer hardware, programming, applications and future possibilities are all covered by our experienced team of writers, each of whom deals with one aspect of personal computing.

Contents:

The World of Personal Computing . Henry Budgett
Personal Computers in the Home . Ian Graham
Personal Computers for Learning . Eric Deeson
Personal Computers in Business . David Tebbutt
BASIC for Personal Computers . A P Stephenson
Personal Computer Programming Languages . Garry Marshall
A Look Inside . Ian Sinclair
Where Next for Personal Computers? . Mike James
Glossary of Terms
User Groups and Clubs
Directory of Manufacturers and Suppliers
Index

0 408 01320 6   128 pages   £6.95

ORDER NOW from your local Bookseller

Newnes Technical Books
Borough Green, Sevenoaks, Kent TN15 8PH

A catalogue of all our computer titles is available, please write to Newnes Technical Books — an imprint of Butterworth & Co (Publishers) Ltd

Quentin Heath assesses a re-issued adventure for the Spectrum which is helping to break new ground in developing graphic stories

Trading in galaxies

THE TIME has come to load your ship with cargo and take off for the stars, because this month I want to talk about a space adventure called **Trader.** The game has been around for some time, being distributed quietly by Pixel Productions. Now Quicksilva has re-packaged it and there is a version for the Spectrum available. So I expect we shall be seeing plenty of it in the next few months.

Trader comprises three programs which take you around the known galaxy and, it is to be hoped, back again. Your ship may crash, you may run out of fuel, or it may be stolen — but you stand a good chance of survival. The game includes arcade action but the intellectual abilities of the player are also tested.

The first game lands you on your home base of Epsilon, where you can buy the goods which you hope to trade for profit on other planets. You are told that gold is a useless commodity and has little value, but a certain race of robots find it useful, so you should have some on board.

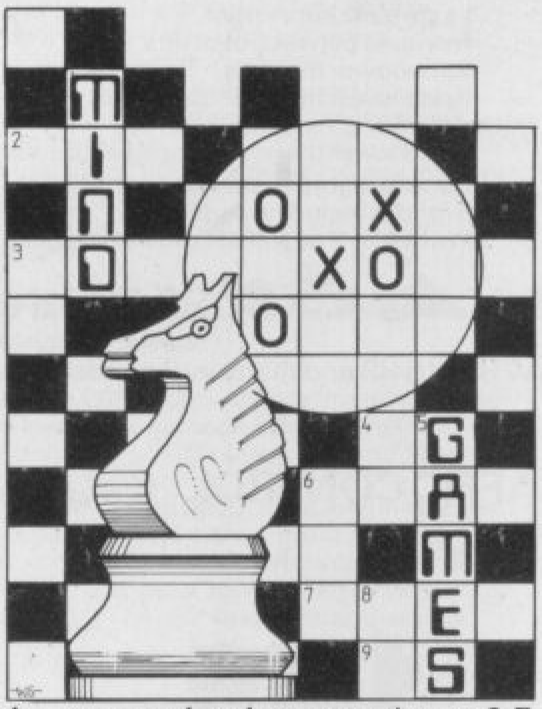
The game is accompanied by a well-presented information booklet but I would not believe everything it tells you, especially where cargo is concerned. Use your own brain and take nothing for granted.

When you have finished buying goods — and that will demand a good knowledge of the game to do successfully — your ship will transport you to the planet Psi. The creatures there have a very strange business sense, as they want some of your brainwaves in exchange for fuel which you need badly.

To get your vibes they will ask questions and if you answer them all correctly, or almost correctly, you will obtain your fuel. If you do not you will lose your ship.

That part of the game requires a good memory; a calculator is helpful to those who cannot multiply, add, subtract, or divide. With a little forethought you can dispense with the calculator and there is no need to find the answers to the mathematical questions. All you need to do is type-in the question. The Psions are not so clever after all.

The encounter with the Psions shows the type of mental activity needed to play the game. You do not have to be a genius



but you need to be as cunning as J R Ewing.

The planet Beta is the next port of call for your ship, the Pegasus. This time you can do as the instruction book advises, since the inhabitants are skilful traders and they will not stop at theft. So look after your ship or, like me, you could finish cargoless.

Your encounter with the planet Gamma is one of the animated graphics and arcade sequences where it is important to have a good set of digits rather than a brain full of digits. Once you have sucked the raw fuel from the surface of the planet, and if you do not crash in the process, you can continue to the planet Delta.

That planet is dangerous because almost all the humanoid inhabitants are hooked on Booster Spice. That does not, however, prevent them carrying-out criminal acts and the profit you thought you could make on Booster Spice may disappear.

You could also lose your ship and have to search through a maze for it. That part of the game is for arcade buffs, though. Trader seems to have been influenced at the design stage by the Dune trilogy of books from which, I suspect, the idea of Booster Spice was conceived.

Much seems to have been made of the Booster Spice — an illegal narcotic substance on some planets — in the instruction booklet and in the game. It is not until the game ends, however, that you can sell your spice — if you are unlucky. Your business sense will then have to go into over-drive.

One thing of which I would warn fellow-travellers, especially if they are just starting their apprenticeship, is not to BREAK out of any of the programs. If you do so even by accident, you will find that you cannot re-start Trader without loading the other parts of the game again.

The reason is that some of the variables used in the game are placed above RAMTOP so that they can be retrieved by all three programs.

At the time of going to press the Spectrum version of Trader was still being programmed, although from what I have seen of it there are plenty of extra twists in the game and, of course, the graphics are more colourful. The package will be available for the 48K Spectrum and should provide an extended game for mind gamers who like to exercise their laser fingers.

The game is different from other adventure games on the market because it is described as a graphics adventure. There are several available, including **Pimania** and, to some extent, **Black Crystal.** That seems to be the direction in which adventures should go, as graphics, either in the form of animation or static pictures, certainly add variety.

Hints and tips

No need for a calculator or computer. The Psions will accept the question as an answer.

You may be in trouble if you leave the cargo list to the computer. It is not difficult to make a copy.

You may find that Booster Spice is not as profitable as you are told when dealing with living zombies.

The paradox where cargo is concerned is that theory does not work in practice — sometimes.

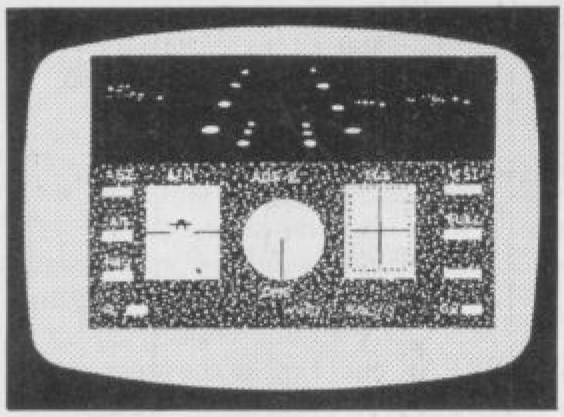
• *If you have views on any mind games or if you have hints and tips on adventure games, computer-moderated games, chess, or anything along those lines you can contact me. I will also try to answer any questions which you may have. The address is:*

Quentin Heath, Mind Games, c/o *Sinclair User,* ECC Publications, 30-31 Islington Green, London N1 8BJ.

Hewson Consultants

We proudly announce our 1983 range of

SPECTRUM CASSETTES



NIGHTFLITE 16 and 48K FLIGHT SIMULATOR

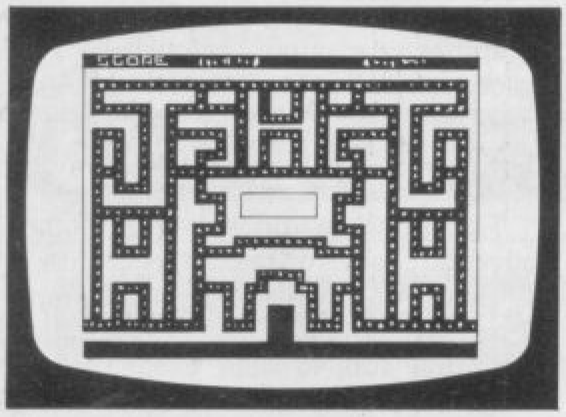
NIGHTFLITE puts you at the controls of a light aircraft flying at night. You can:
Climb, descend, take off,
Land, bank left or right,
Navigate between beacons,
Raise/lower the flaps,
Raise/lower the undercarriage,
Adjust engine rpm,
Raise/lower the nose varying amounts.
Runway lights appear on approach.
5 modes including Autopilot.
Written by a qualified light aircraft pilot.

A/H – artificial horizon
ALT – altitude in ft
HDG – heading in compass degrees
FL – flaps up/down
GR – gear up/down
VSI – vertical speed indicator
WIND – wind direction/velocity
DME – distance measure equipment
ADF – automatic direction finder
ILS – instrument landing system
VOR – VHF omni directional range

£5.95 our runaway best seller

Available through W H SMITHS and many independent micro-computer shops

COMING SOON:– **AIR TRAFFIC CONTROL** – Puts you in command at Heathrow Airport **£7.95**

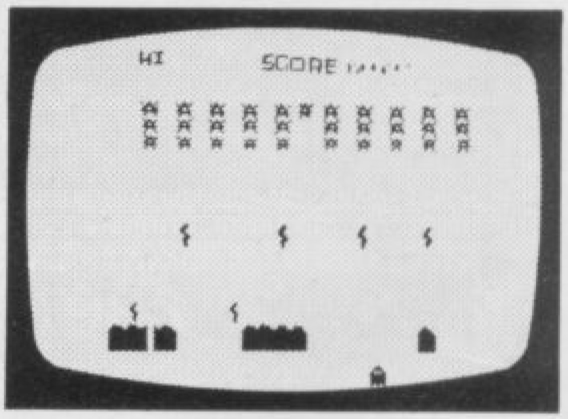


£4.95
All action game

MAZE CHASE
16 and 48K

4 or 8 Mazes, Highest score to date, 4 independent guardians, 3 lives, Full colour, Fast machine code action, magic strawberries, eat lemons to score more, real time scoring.

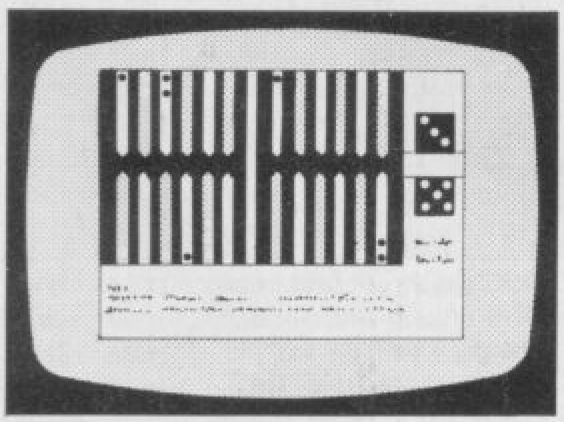
£4.95
Are you fast enough?



SPECVADERS 16K

Defeat each squadron of Beeple Zaps and another appears only closer. Cyrian mothership with ejecting Zeetle Baps.

5 levels of play from Orions snails pace to close your eyes and hope. Real time scoring. 3 lives. Pan galactic gargle blaster for highest score. Descending asteriods.



£5.95
A real challenge

BACKGAMMON 16K

8 Levels of play from novice to expert. Full colour display of tables and dice. Gamble on a single game or a series, double or quits. All the features of the ancient game.

£5.95
Another first



COUNTRIES OF THE WORLD

16 and 48K on one cassette
Countries of the World is an educational package designed to give an appreciation of the location of all the main countries and some information about them.
16K version displays a world map, shows the position of each country and names its capital.

48K version: all the above plus prints the population, size, currency, and main languages of each country, and statistics on largest and smallest countries etc.

PLUS: Two complete world map screen displays for you to include in your own programs.

Hewson Consultants
SPECTRUM BOOKS



Available through Computer Bookshops and W H SMITH.

40 BEST MACHINE CODE ROUTINES FOR THE ZX SPECTRUM — £5.95

By Andrew Hewson and John Hardman

Section A: Three chapters explaining what you need to know about Z80 machine code on the Spectrum.

- How to load and save machine code.
- How to use the system variables.
- How memory is organised.
- How program lines are stored.
- How to use the stack, the display, the attribute files.
- How to call ROM routines – where they are and what they do.
- The structure of Z80 code – plus a valuable glossary.

Section B: 40 routines including,

- Scroll – up, down, side to side by pixel or by character.
- Search and replace, token swap, string search.
- Rotate character, invert character – horizontally and vertically.
- Line renumber – including GOSUBs, GOTOs, RUN etc.

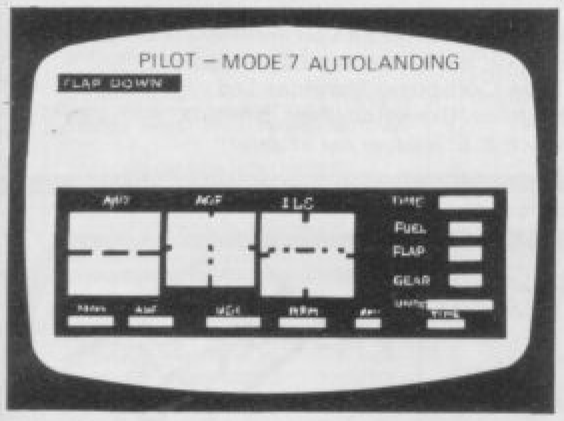
This book teaches the beginner all he needs to know in a simple, easy-to-learn form and its an invaluable reference work for the expert too!

20 BEST PROGRAMS FOR THE ZX SPECTRUM — £5.95

By Andrew Hewson

Program titles include:
Machine Code Editor – Write, modify, extend and load machine code using this all-basic program. No need to use an Assembler when you have this program.
Index File – Learn about fixed length records, save numeric and string information, add to, sort, modify, delete and print your records. Ideal as a computer based filing system.
Duckshoot – Learn how to manipulate the attributes file *and* have fun at the same time.
Graphix – Construct up to 210 graphics characters with the full on-screen editing facilities, enhance and modify them and recall them later to build a detailed display to save on cassette.
Spiromania – A program to stretch your artistic talants, imagination and ingenuity. Draws a limitless variety of curves and spirals.
Plus: FOOTBALL, DIGITISER, DIARY and many more.

ZX81 BEST SELLERS



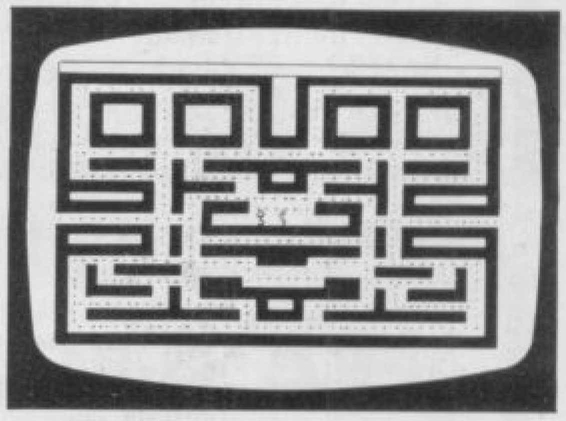
PILOT 16K (ZX81) — £5.95

Fly your own aircraft.
Instruments and readouts:
A/H, ALT, HDG, FL, GR, VOR, VSI, WIND, DME, ADF, and ILS
see "NIGHTFLITE". Essentially the same as "NIGHTFLITE" but without the Hi Res Graphics.



HINTS & TIPS FOR THE ZX81 — £3.95

Passing data between programmes,
Calling subroutines from cassette,
Machine code programmes.
Bits, bytes, addresses and hexodecimal plus much more.



PUCKMAN 16K (ZX81) £5.95

3 Mazes.
Highest score to date.
4 Independent guardians.
Magic strawberries.
Real time scoring.

RETAILERS

We are continually on the look out for new outlets. if you are interested in stocking the items advertised here, write to us for our trade rates.

URGENT

We require high quality Spectrum and Dragon software. Good royalties paid. Send your samples today for fast evaluation.

THE PROGRAMS

The programs advertised here are available from computer bookshops with a software stand, and many independent micro-computer shops.

ORDER FORM — Make cheques/PO's payable to Hewson Consultants

Quantity	Product	Cost

Name ______________________ Total ________
(Block Capitals Please)

Address ______________________

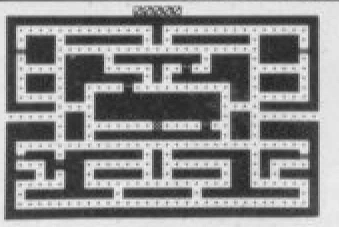
______________________ Signed ________

My Access/Barclaycard No. is ______________________

Post to: **HEWSON CONSULTANTS**, 60A St Mary's Street, Wallingford, Oxon OX10 0EL.
Tel (0491) 36307.

GOBBLERS

PUCKMAN FOR 16K ZX81



BEAT THAT HIGH SCORE! GOBBLE THOSE DOTS BEFORE THOSE MEANIES GOBBLE YOU! YOUR ONLY AIDES ARE FOUR "POWER PILLS" WHICH MAKE THE MEANIES EDIBLE. BUT NOT FOR LONG!

- MACHINE CODED FOR FAST ACTION
- EXTRA "GOBBLER" FOR 10,000 POINTS
- ON SCREEN SCORING
- HIGH SCORE WITH "ENTER NAME" FACILITY
- UP TO 4 PLAYERS

AN ANNOYINGLY FRUSTRATING GAME FOR ONLY £5.95

ASTEROIDS

FOR 16K ZX81

STAY ALIVE AS LONG AS POSSIBLE IN OPEN SPACE FILLED WITH FLYING ROCKS. SCORE BY SHOOTING THEM – WHICH ALSO CAUSES THEM TO BREAK INTO LOTS OF LITTLE BITS AND MAKES LIFE EVEN WORSE!

- MACHINE CODED FOR FAST ACTION
- ON SCREEN SCORING
- HIGH SCORE WITH 'ENTER NAME' FACILITY
- UP TO 4 PLAYERS
- EXTRA SHIP FOR 1,000 PTS (NOT AS EASY AS IT SOUNDS!)
- SHIP MOVES JUST LIKE ARCADE VERSION
- ROTATE LEFT/ROTATE RIGHT/THRUST
- FIRES IN ALL 8 DIRECTIONS
- INCREASING NUMBER OF ASTEROIDS
- THREE ASTEROID SIZES
- 'NASTY' ALIEN SPACE-SHIP (FIRES BACK!)

THIS GAME IS JUST AS BAD – AND ONLY £5.95

AN OFFER FOR REAL MASOCHISTS – BOTH TAPES FOR £9.95

MAIL ORDER ONLY-PLEASE MAKE CHEQUE/PO PAYABLE TO

THE SOFTWARE FARM Dept. SU
CRAIGO FARM, BOTANY BAY, TINTERN, GWENT

NOW AVAILABLE FROM HILTON COMPUTER SERVICES LTD

The P.B.S. Bank reconciliation is believed to be the first such program to be available for the Sinclair ZX81, the ZX Spectrum and Dragon.

Just look at some of its features:

* Automatically matches bank statement items with transactions recorded in your "Personal Banking System."
* List all outstanding items such as uncleared cheques, funds received but not advised to you, bank charges — highlights all discrepancies. No more scratching around to try and find out why your statement balance is different to what you expected.
* Full search facilities allowing on-screen correction of any item.
* Saves and loads data to and from tape (ZX81 version, at double speed). Exchanges data with the main P.B.S. program. No need to save programs.
* Single key operation — uses m/c keyboard scan for single letter commands (ZX81 version).
* Extremely easy to use. No jargon to wade through before you get started. Demonstration program included.
* All item lists, searches (with totals), etc. can be output to your ZX printer.
* Full instructions included.
* Unique after sales maintenance provided.
* Operates in conjunction with "Personal Banking System" (Full input and correction facilities plus automatic posting of standing orders on due dates).

So banish the headaches, make life easier for yourself, send £15 for the Personal Banking System plus P.B.S. bank reconciliation and users manual.

Existing clients need only send £5 for the P.B.S. bank reconciliation which will operate with their present P.B.S.

The Personal Banking System (as reviewed in Popular Computing Weekly — 1st July) is available separately for £9.95 for cassette and user manual. ZX81 P.B.S. owners can order the Spectrum version for just £5.

Please specify whether ZX81 (16K) or ZX Spectrum (48K) or Dragon.

Guaranteed software available from:
Hilton Computer Services Ltd
14 Avalon Road, Orpington, Kent, BR6 9AX.

Your P.B.S. is never out of date!

TASWORD THE WORD PROCESSOR

48K SPECTRUM

"Very good value and great fun to use."
"Unreservedly recommended."
Popular Computing Weekly 19/8/82 – ZX81 Tasword

Now your Spectrum becomes a word processor with TASWORD. All the features of the ZX81 Tasword plus many extras. Designed to fully utilise the capacity and capabilities of your 48K Spectrum. More than 6K of machine code, a Basic program, and a manual, to give you a usable and powerful package.

Use TASWORD to produce your letters, essays, papers, records, lists, and for almost any task that requires the written word.

Whether you have serious applications or simply want to learn about word processing, TASWORD makes it easy and enjoyable.

TASWORD TUTOR
"an eloquent demonstration of Tasword's uses"
We send you a manual and a cassette. The cassette contains TASWORD and TASWORD TUTOR. This teaches you word processing using TASWORD.

£7.95 fully inclusive mail order price.

£1 DEMONSTRATION CASSETTE

See for yourself what TASWORD can do. Send just £1 for a demonstration cassette. This cassette contains the TASWORD program (with some facilities inhibited) and a text file which describes and demonstrates the performance and features of TASWORD. A voucher is included which gives you 50p off the price of Tasword.

TASMAN SOFTWARE

17 HARTLEY CRESCENT LEEDS LS6 2LL

ZX81 TASWORD

Tasword for the ZX81 (16K) is still available at £6·50. No demonstration cassette available but send 50p (refundable against your subsequent purchase of ZX81 Tasword) for a copy of the manual.

sinclair supermart

SPECTRUM "3 CARD BRAG" (16/48K). Totally original, addictive card game for one player. Computer actually bluffs. £3.95. M. Alexander, 24 Whitecross Road, Hereford HR4 0DG.

CHEMISTRY EXAMS? No problem with Alchemy Software. 6 Program covering formulae and calculations for o/cse each with extensive notes for ZX81 and Spectrum. Send SAE for details to Alchemy, 78 Tweendykes Road, Hull.

ASTRO-WARS

Games Tape 3 for the 16K/48K Spectrum comprises: All machine code real-time, 3-D game based on the films "STAR WARS" and "THE EMPIRE STRIKES BACK". Some of the best graphics and sounds yet seen on the Spectrum. 3 games in one. Also contains 3 games of logic: 3D noughts & crosses, Tower of Brahma, Wipe-out. All for only **£6.95 inc. p&p.**

Spectrum ROM disassembler — translates Sinclair's ROM into readable mnemonics. **£2.00 inc. p&p**

Games Tape 2: Fruit Machine, Battleships, Fighter Pilot, Night Fighter, Defender, Missile Command. ZX-81(16K) — **£4.95**, 16K/48K Spectrum — **£6.95 inc. p&p.**

Other game and educational software available. SAE for further details/up-to-date price list to:

Precision Software Engineering, 20 Shelton Ave., Newark, Notts NG24 4NX.

ZX81 SPECTRUM, DRAGON, BBC AND VIC SOFTWARE LENDING LIBRARY

We have for hire from 50p (inc. post) programs for your computer.

£5 life membership (less than the cost of a single game) brings you the SOFTWARE LENDING LIBRARY membership kit, catalogue and newsletter.

Send cheque or PO for £5 to:

**SOFTWARE LENDING LIBRARY
PO Box 3, Castleford, West Yorks
Starting name, address and computer type.**

All tapes used with manufacturers' permission.

E.S.P. ESTUARY SOFTWARE PRODUCTS — A NEW NAME IN THE sinclair SOFTWARE

HITCH-HIKERS

GUIDE TO THE

GALAXY

For 48K Spectrum £8.95
Also for Apple 2 £6.95

Please allow 14 days delivery.

216 Victoria Avenue, Southend-on-Sea, Essex. Credit card holders may phone in their orders (0702) 43568

SOFTWARE EXCHANGE

Swap your used software via out club. FREE membership £1.00 per swap. Most computers included. SAE for details.

UKSEC 15 Tunwell Greave Sheffield S5 9GB.

PROGRAMMES FOR LEARNING

SPECTRUM programmes for schools and parents which have been RESEARCHED and TESTED by teachers.

Introductory offer (16K or 48K) — BASIC MATHS for 7 to 12 years which teaches addition, subtraction, long division, long multiplication and tables. Programmes adjust to age and capability and take pupils to higher levels of complexity while developing calculation speeds. Use for remedial or advanced tuition. All 5 programmes — £7.60.

For details/ cheque please write to Dr Glasson, 94 Airedale Ave, Chiswick, London W4 2NN.

ZX SPECTRUM

Superb Bug-Byte Programs

Spectral Invaders — the renowned version of space invaders. Written in machine code for fast action (16K) — £5.

Spectres — highly acclaimed program. Eddy the electrician thwarting the ghosts with secret light generator. (16K or 48K) — £8.

All orders despatched first class post on day of receiving order. Prices include postage and packing. Send without delay to:- SUPERSPRINT SOFTWARE 75, Keswick Drive Lightwater, Surrey.

ZX80/ 81 NANOS Quick Reference Cards

Why waste time and frustration struggling with the books? this card has it all. "There is nothing like it in the world". Send £3.50 per card to

ELKAN ELECTRONICS, (Dept. SU) FREEPOST, 11 Bury New Road, Prestwich, Manchester M25 6LZ or tel. 061-798 7613 (24 hours)

— other Sinclair items also available —

NOW! COPY COMPUTER TAPE PROGRAMS FROM TAPE TO TAPE

Ideal for user groups who want to share their own programs without having to load and save through a computer. It will even copy machine code programs.

Unit plugs between earpiece of one cassette and microphone input of the other.

Unit is fitted with two 3.5mm jack sockets and is self powered with internal PP3 battery (not supplied). At present only for the ZX Spectrum. Soon to follow for the ZX-81.

Price £7.95p + 25p p&p.

Send cheque or PO to:
**JILES ELECTRONICS
48 Parkway, Chellaston
Derby DE7 1QA.**

SPECTRUM OWNERS

Why wait for weeks? High speed hire service for all the software you could want. All it costs is £10 life membership, plus £1.25 per tape (inc p & p).

Now you can TRY the best programs before you BUY.

Join today. Send £10 for life membership and first free tape to:

**SPECTRAL SOFTWARE LIBRARY
13 Charlecote Road, Poynton
Stockport, Cheshire SK12 1DJ**
or send SAE for details

"MURDER ON SPEC"

for 16K Spectrum:

A brain-teasing whodunit game for 1-7 players: 60 suspects, solutions with motives, graphics, in 4 parts covering far more than 16K: £5.50.

"CRICKET ON SPEC"

Summer's coming! Refreshing 16K game with full range of shots, complete scoreboard. £4.50.

MICROJUICE

46, Ainger Road, London NW3
Tel: 586-4740

GREEN & BLUE T.V. FILTERS

- For the best quality & clarity celluloid filters.
- Strong & flexible with easily removable fittings.

Up to 18" £3.00 includes 1 green & 1 blue
19" to 28" £4.00 + fittings and P&P in U.K.
Allow 14 days delivery.

• SEND CHEQUE/ P.O. TO: •

**COMPUTER ANCILLIARIES
13 Redland Drive, Chilwell, Notts NG9 5JZ**

LOCATOR

MICRO COMPUTERWARE
SPECTRUM STOCKIST

CHESS 48K (ARTIC)	£9.45
STAR TREK 48K (R + R)	£4.95
CHESS PLAYER 48K (Q-S)	£6.95
TIMEGATE 48K (Q-S)	£6.95
MINED OUT 48K (Q-S)	£4.95
SPACE INTRUDERS 16K (Q-S)	£4.95
METEOR STORM 16K (Q-S)	£4.95
GOLF 16K (R + R)	£3.75
GOBBLEMAN 16K (ARTIC)	£4.95
TELESOUND 84 (COMPUSOUND)	£9.95
BEEP BOOSTER RADIO (.)	£5.95

EDUCATIONAL SOFTWARE — largest collection available for SPECTRUM — also ZX81

SAE for details.

1 Cassette 35p p + p: 2 Cassettes p + p FREE

**Mail order and local deliveries only
Locator, 12 Fernhall Drive, Redbridge, Essex, IG4 5BN. Tel: 01-550 5675.**

FOR HORSE RACING ENTHUSIASTS

'THE SETTLER'

Work out your winnings on accumulators, yankees, trebles etc. Available on cassette for ZX81 (16K) or SPECTRUM. Includes the professionally used **SAFE BET SYSTEM** and also the **NEW FORMULA STAKING PLAN** at no extra cost! (Both these plans have been advertised in the S.C.H.B. for two years at £27.) This whole package for only **£10.**

Also available: the highly successful **'POOLS FOR PROFIT'** system. NOT a forecasting program but a highly ingenious mathematically stratified method of entry. Complete checking program on cassette and full instructions etc. Price **£10.**

IMPORTANT — these are NOT games

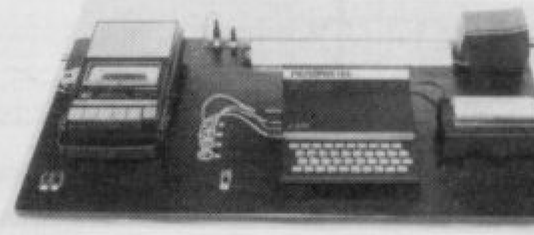
But programs to help you earn money for a change. Mail remittance to:

**BRITISH SPORTING SERVICES, (SU)
45 Sandringham Road, Norwich**

JUPITER ACE USERS CLUB

Newsletter, software (both games and utilities), adapter for ZX81 add-ons. SAE for details.

Remsoft, 18 George Street, Brighton BN2 1RH



SIZE 30" × 18"

LAMINATE FINISH

3 POWER SWITCHES

SPACE FOR ADD-ONS

£19.95 inc.

ZX-81/ SPECTRUM WORKSTATION

Prevents memory loss through jolts to system. Cooling hatch under computer and peripherals securely attached in position. Professionally styled.

14 day unconditional money back guarantee

BAKER MF, UNIT 6, WOOLSBRIDGE IND. ESTATE, THREE CROSS, DORSET BH21 6SH

SPECTRUM SOFTWARE

All programs menu driven with colour and sound.

Pools Forecasting Aid. Take advantage of a statistical analysis of results since 1952 and the evaluation of draw trends and cycles discovered. Direct-from-coupon input, review and print-out facilities. 16K or 48K.

STOP PRESS: Wins have already been reported from users of POOLS PROGRAM.

Biorythm: Taken seriously by many. Based on scientifically accepted principles of 'life cycles', this program offers an accurate and comprehensive prediction of physical, emotional and intellectual levels of intensity. 16K only.

Cheques/ PO's for £4.95 (16K) or £5.95 (48K) inc. p&p to: J. English, 10 Meadow Close, Shipdham, Thetford IP25 7NF.

FOR THE SPECTRUM (48K) BREWERY

A MANAGEMENT SIMULATION GAME

You are the owner of a small local brewery. Can you exercise your business acumen to expand and become as big as Whitbreads or Courage? This is a game of skill, with many special features:

- Product design/development
- Negotiate with suppliers for raw materials
- Plan advertising, monthly production and pricing strategies
- Negotiate purchase of pubs
- Expand production capacity
- Negotiate wage claims
- Save game facility.

All this and more for just **£5.95** from **P. BOULTON, Dept. SU, 54 Grange Road, South Harrow, Middlesex.**
Daytime phone no: 868 1666 x3022

ZX81 (16K) also (64K)

Fast SAVE/ LOAD program

up to 20X Sinclair speed (4800 BAUD) now with VERIFY and any part of memory SAVE. Includes tape loading aid. £6.00 incl. VAT & P&P.

Tape loading aid on its own £3.00 incl. VAT & P&P.

Details: 50p refundable against purchase.

**MUSAMY SOFTWARE
136 Brettenham Road,
Walthamtow, London E17 5BA.**

ZX-81 + 32K Ram including manual, leads etc. Three games: Scramble, Starfighter, Chess. Bargain **price-£80** o.n.o. Philip Potter, 95 Byrons Lane, Macclesfield. Tel: Macclesfield (0625) 24771 evenings (not Thursday).

HORNBY SOFTWARE

PRO GOLF Spectrum game, 16K and 48K. Realistic game. Highly popular. 9-hole course. Choose your own club, miss the bunkers, water, out of bounds. **£4.95 incl. p&p.**

TROON Spectrum game, 48K only. Highly skillful. 18-hole championship course with graphics. To any handicap. **£6.95 incl. p&p.**

FAMILY GAMES PACK including Sums (maths. aid), Pontoon, Greyhound, Parachutist and Rear Gunner. Spectrum 16K and 48K. **£4.95 incl. p&p.**

**Hornby Software
21 Pinfold Hill
Leeds LS15 0PW.**

FOOTBALL POOLS PROGRAM

- Lists out, in order of preference, the 16 most likely score draws, also the 16 most likely homes, draws and aways.
- Picks out the results on the bookmakers' FIXED ODDS coupons that have been given over-generous odds. Calculates your expected profit!
- Allows the user to update the tables week by week as the results come in.

This programme is available on the ZX-81 (16K) and ZX Spectrum (48K only)

For a copy of the program on a quality cassette, plus an information leaflet giving a brief explanation of the theory, send £5.95 to:

**HARTLAND SOFTWARE
(DEPT.S), 8 PENZANCE PLACE, LONDON W11 4PA.**

For ZX-81 from IVOR KILLERBITE

BOOK:
"Write efficient ZX-81 BASIC". "Amazing": Sinclair User, Jan. 1983. An essential follow-up to the Sinclair Manual.

CASSETTE 1 (1K):
"Sweet Sixteen" 16 great 1K BASIC programs (8 action games, 8 general interest).

CASSETTE 2 (16K + printer):
"Wordkill" Word-processor: 210 lines of 42 characters; lower case, etc; full line-by-line manipulation; 30 char./secs. printing.
Each item (including VAT/P&P) — **£5.00**. Send orders (with cheque/PO), specifying items(s) required and your name/address, to:

IVOR KILLERBITE
10 Elson Road, Formby, Liverpool L37 2EG.

20 1K ZX-81 GAMES including Duckshoot, Connect 4, Battleships, 4×4 O's & X's, Blackjack, Stocks 'n' Shares, Hangman, Solitaire, Acey-Ducey, Mastermind, Hexpawn, Motorbike, Treasure and more! Cassette and instructions only £3.95. S. Kelly, 7 Atherton House, Harewood Road, South Croydon, Surrey CR2 7AL.

ZX-81 GRAPHICS

This fabulous graphic add-on enables you to define up to 256 graphic symbols on any ZX-81. The most exciting aspect, though, is that a program loaded onto the pre-defined graphics will automatically make use of the new graphic symbols. This goes for BASIC programs as well as for auto-run Machine Code programs.
The add-on is supplied with full instructions and will fit neatly inside your ZX-81.

Price £15.00 Incl. P&P
R. Falk, Hoegevej 3, 2970 Hoersholm, Denmark.
Dispatch by air mail within 48 hours.

SPECTRUM TAPE header reader (16/48K). Reads the information hidden in the header. e.g. code block addresses, lengths, start lines etc. cassette £2.95 + 55p p&p W. Burns, 36 Luccombe Road, Shirley, Southampton SO1 2RP.

'ODDS ON'
(Spectrum 16K/48K)

An exciting Horse Racing Game for up to 4 players. Full scope for straight betting or accumulators. Sound and fully animated horses, with form sheets on screen and fully changing odds. Presented on high quality cassette complete with instructions. £4.75 post paid.
WANTED. We are constantly on the look out for well written programmes. SPECTRUM/ZX81. We pay 20% Royalties. Send cassettes/listings/S.A.E.
R.S.D. 33 Gardner Road, Prestwich, Manchester.

ZX-81 + 16K Ram Pack 1 month old. File sixty keyboard, all leads, manual, 3 tapes. Bargain at £70. Stamford 721569 (after 4.30).

ZX Spectrum—CP48 32K Memory Extension

Gives total of 48K. Simply fits internally on series 2 models with no soldering. Similar to competitors but only £24.50. Fitted by our engineers (dont send power supply) £31.50.

Citadel Products Ltd
Dept. SU, 50 High Street, Edgware, Middlesex, HA8 7EP. Tel: 01-951 1848

ANVIL COMPUTING

SUPERB NEW SELF TEACH PROGRAM
For ZX-81 (16K). Spectrum. TRS80. Video Genie.

• Now you can learn basic fast and efficiently •
•Forget your past programming problems. This program will make it all clear•

Covers Arrays, Sorting, Searching, Counting, Decision making tests, Error Trapping, Menu driving etc. You start with short simple programs and build up to full working programs with everything explained,in full, precise detail.

•This is *NOT* a program you simply copy and run.• ••*YOU HAVE GOT TO WORK!!*•• But it is written in such a way that you can not get stuck.

This program has been fully tested over the past six months by 50 domestic and small business users and we have not received any adverse reports.

This program is our own product and is not available from any other source. Full money back guarantee. **£4.75** incl Postage & Package (state which computer).
51 Whitcliffe Lane, Ripon, Yorks HG4 2LB.

Erricks' of Bradford
ZX-81/PERIPHERALS/ SOFTWARE
All from stock
Rawson Square. (Bradford) 309266

SPECTRUM 48K COPY TAPE

Copies any Spectrum file type (program, code, data) plus "Headerless" files, up to 40K, quickly and easily. Also displays file details: length, start, etc.
N.B. Must not be used to infringe copyrights.
£4.95
N.G. EDWARDS, 25 DALES DRIVE, WIMBORNE, DORSET.

SPECTRUM Machine code program for duplicating any tape £7,50 Scrren Toolkit £3.50 Power Supply Filter easy fitting £3.50 M. Lamb 6 Park Street Scarborough, North Yorks.

ZX-81 16K RAM QS add-ons, mother board, char. gen., sound board, telesound modulator keyboard, QS software for boards, much other software. Worth approx. £50. The lot for £100. Phone 0494-452054 evenings.

ASTRO SOFTWARE

CASSETTE 1 **16K ZX-81**
BATTLESHIPS: Just like the pencil & paper game.
HOUSE OF MYSTERY: Find the Princess before escaping.
FRUIT MACHINE: Includes a hold routine.
BUG-MAN: Eat the dots while trying to avoid the MONSTER.
CODE-BREAKER: Guess the 3, 4 or 5 digit number.
PONTOON: Try to beat your ZX at this difficult card game.
HANGMAN: Guess the word and save the innocent man.
DEFENDER: Defend the earth from non-stop attack.
*** 70K of Programs**
A genuine bargain at **£3.95**.

20% royalties paid
Send cheques/ PO's to:
Astro Software, 28 Spinney Rise, Toton, Beeston, Notts NG9 6JN.

ONLY 1K?

1K of machine code
make the most of your 1K ZX81 with our specialist machine program. Write or phone for free catalogue.
Selec Software, 37 Councillor Lane, Cheadle, Cheshire. 061 428 7425.

ZX SPECTRUM: Sheepwalk

SHEEPWALK? You may laugh, but its more difficult than zapping aliens! The one you haven't seen before. Specify 16K/48K. **£3.25**
Cheques and POs to:
GT Software 8 Bull Street, Potton, Sandy, Beds.

ZX81 VIDEO INVERTER

Save your eyes. Increases save level. Displays sharp white characters on solid black background screen. Kit £4.00. Built £5.00. Includes VAT & P/P. As reviewed in *Popular Computing Weekly* August 26th. Send cheques/postal orders to:

D. FRITSCH
6 Stanton Rd., Thelwall, Warrington, Cheshire WA4 2HS.

Sell your used computer or peripherals through Sinclair Supermart at low cost... up to 30 words for only £5.

Have you updated your computer or do you no longer use that add-on? Instead of leaving it lying around, turn it into cash be placing a classified advertisement in Sinclair Supermart and reach around 65,000 users of the Sinclair ZX systems. Please write your advertisement in the boxes below, one word per box. Underline words required in bold type. Your name, address and/or telephone number should be included *Please print in block capitals.*
Note—this service is open only to private advertisers. The advertisement will appear in the earliest possible issue.

Name: ....
Address: ....
.... Tel: ....

Have you included the fee of £5?

Conditions
The Advertisement Manager reserves the right to alter, reject or suspend an advertisement without assigning any reason. Advertisements are accepted subject to approval of copy and to the right of the Advertisement Manager to alter, reject or cancel any order without explanation. The Proprietors are not liable for any loss from any cause whatever, nor do they accept liability for printers' errors. The Advertisers shall indemnify the Publishers in respect of any claim, cost and expenses arising out of any libellous or malicious matter or untrue statement in any advertisement published for the advertisers, or any infringement of copyright, patent or design therein. The placing of any order will be deemed to be an acceptance of these conditions.

Advertisement Index

SPECTRUM COMES TO LIFE !

ABBEX

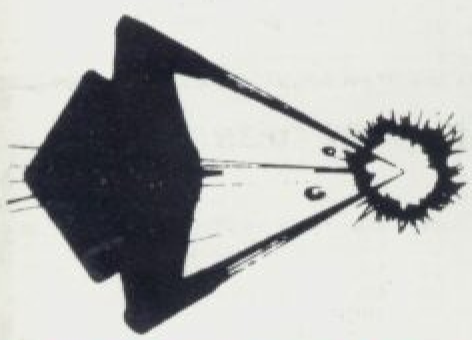
THE GAMES PEOPLE

SPOOKYMAN



EAT THE PILLS AND KEEP AWAY FROM THE GHOSTS. EAT THE VITAMINS AND CHASE THE GHOSTS. FULL MACHINE CODE ARCADE ACTION AND SOUND. DESIGNED TO MAKE YOUR ADRENALINE RUN HIGH. PRICE £4.95

COSMOS



YOU HAVE THE JOB OF PROTECTING A CONVOY FROM ALIENS AND METEOR STORMS. WATCH OUT FOR THE SPACE MINES AS YOU PLAY THIS AMAZING MACHINE CODE ARCADE ACTION SIMULATION PROGRAM. PRICE £4.95

OTHER GAMES IN OUR SPECTRUM RANGE INCLUDE: ANDROIDS RUN, HIGH NOON, ETX, INVASION, FAUST'S FOLLY (Adventure), HARRIER - ALL AT £5.95

ABBEX ELECTRONICS LTD.
20 ASHLEY COURT, GREAT NORTHWAY, LONDON NW4
Tel: 01-203 1465

PLEASE COMPLETE IN BLOCK CAPS
NAME (Mr/Mrs/Miss) ....
ADDRESS
(CARD HOLDERS) ....
POST CODE .... PHONE NO. ....

Make cheques payable to ABBEX ELECTRONICS LTD.

I enclose my cheque for £

I wish to pay by ☐ CHEQUE ☐ ACCESS Signed ....
Please debit my creditcard a/c
NUMBER ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ date ....

Please send me the following
(Allow 14 days for delivery)

☐ **SPOOKYMAN**
PRICE £4.95

☐ **COSMOS**
PRICE £4.95

☐ **OTHER GAME** ....
PRICE £5.95

☐ **CATALOGUE**

WHO ON EARTH COULD HAVE CONCEIVED QUICKSILVA SOFTWARE?

TIME-GATE
by J. Hollis

THE UNBELIEVABLE SPACE/TIME ADVENTURE FROM QS!

High speed graphics combined with electrifying space adventure make TIME-GATE the game of all games.
Foil the ruling aliens by travelling back through time and blasting out their home planet. Fight 3D space battles on your journey, seeking the time gates that lead to year zero and the salvation of the human race.
Features: 4D — High speed graphics — versatile scanning — status and battle computers — land & take-off from many planets — time-travel — 5 skill levels — score & rating plus free training program.
SPECTRUM 48K

NEW! TORNADO . . .
by Chartec

ONLY AVAILABLE FROM QS!

Your ship is a Tornado. A craft specially designed for use over the Red Planet able to manoeuvre fast and effectively in the thin atmosphere. Now the end of Colony Wars is in sight, a final pocket of seething hate has been located and is about to be eradicated, the last clan will shortly fall . . . If the mission is successful. . .
Features: Full Colour High Res Graphics — Sound — Scoring — Ships Attacking — 3 Types of Ground Base — 2 Player Option — Increasing Speed — High Score — Progressive Difficulty — Random Landscapes — Explosions.
VIC 20 + JOYSTICK

NEW! GALAXIAN & GLOOPS
by T. Beckwith

GALAXIAN
The battle rages on the distant planet. Only you can save the peaceful population under attack. Are you good enough?
Features: Full Attack Mode — High Score — 2 Types of Swooping Bomb Dropping Galaxian — 3 Bases — Full Scoring — Adjust Speed, Fire Rate, Number of Galaxians.

GLOOPS!
Quicksilva offer this special version of the famous pill-eater on this tape just for the hell of it!
ZX81 16K

NEW! MAGIC WINDOW
by M. Walker

Character Generator supplied on tape.
Features: Define characters on 8x8 grid — Save to Tape — Load from Tape — Hex & Dec O/Ps
Character Manipulation: Mirror — Rotate — Invert — Left — Right — Up — Down — Hold — Wipe — Cancel
* Redefine Whole Character Set *
Also works in Colour Mode
Excellent examples supplied.
ATARI 400/800 + JOYSTICK

NEW! MUNCHEES
by A. Laird

Outwit the Ghost in the creaking house.
Keep taking the pills — Power Pills to keep you one step ahead of a sticky end!
Features: 1-4 Ghosts — 3 Munchees — Power Pills — Side Doors — Fruit — High Score — Bonus Munchy — Increasing Speed.
ZX81 16K

NEW! MINED-OUT
by I. Andrews

Enter the minefield at your peril. However, you must save Bill the Worm at all costs. If you are very skilled you will be able to rescue the Damsels in Distress, also trapped in the minefield.
Features: 9 Levels of Play — High Score — Progressive Difficulty — Tricky Mines — Damsels in Distress — Mine Detector — Safe Area
SPECTRUM 48K

NEW! CROAKA CRAWLA
by J. Field

Save Clint Frog from a messy fate. Watch out for the relentlessly approaching trucks that are tired of hedgehogs. Look out for the Crocodiles, they are equally Frog-Hungry!
Features: Frogs — Lorries — Logs — Turtles — Different Levels of Play — Scoring — Frog Count — Flies — Crocodiles — Sinking Turtles — Progressive Difficulty — Attack Waves
ZX81 16K

CHESS PLAYER
by M. Wren-Hilton
Speech & Personality
SPECTRUM 48K

SPEAKEASY
by J. Hollis
Add sound or speech to your program
SPECTRUM 48K

METEOR STORM
Speech and Arcade Action
SPECTRUM 16K

SPACE INTRUDERS
Mutants and Arcade Action
SPECTRUM 16K



For the ZX81 & 16K Ram:
QS SCRAMBLE QS INVADERS
QS ASTEROIDS QS DEFENDA

TORNADO	NEW!	VIC 20	+ J/S	£5.95	☐
MAGIC WINDOW	NEW!	ATARI	400/800 + J/S	£8.95	☐
TIME-GATE		SPECTRUM	48K	£6.95*	☐
MINED-OUT	NEW!	SPECTRUM	48K	£4.95*	☐
CHESS PLAYER		SPECTRUM	48K	£6.95	☐
SPEAKEASY		SPECTRUM	48K	£4.95	☐
METEOR STORM		SPECTRUM	16K	£4.95*	☐
SPACE INVADERS		SPECTRUM	16K	£4.95*	☐
GALAXIAN & GLOOPS	NEW!	ZX81	16K	£4.95	☐
CROAKA CRAWLA	NEW!	ZX81	16K	£3.95	☐
MUNCHEES	NEW!	ZX81	16K	£3.95	☐
QS SCRAMBLE		ZX81	16K	£3.95	☐
QS INVADERS		ZX81	16K	£3.95	☐
QS ASTEROIDS		ZX81	16K	£3.95	☐
QS DEFENDA		ZX81	16K	£3.95	☐

* FREE KEYBOARD OVERLAY WITH THESE GAMES *

PLEASE SEND ME THE GAMES AS TICKED

NAME ....

ADDRESS ....

....

....

Access VISA

SEND ORDER TO:
QUICKSILVA, DEPT SU, 92 NORTHAM ROAD, SOUTHAMPTON SO2 OPB TEL: (0703) 20169

AVAILABLE FROM BOOTS, W.H. SMITHS, MENZIES AND ALL LEADING COMPUTER STORES.